UCE CHEMISTRY, PAPER 1

	YEAR	
	1987	
	1988	
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	2007	
	2008	
	2009	
	2010	
	2011	
	2012	

CLICK HERE TO SEE FREQUENTLY ASKED QUESTIONS.

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545/1 CHEMISTRY PAPER 1 Oct./Nov. 1987 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*Electronic calculators must **not** be used.*
*You are required to write the correct answer **A, B, C,** or **D** against each question in the box on the right-hand side of each page.*

1. Which one of the following elements reacts with nitrogen when heated?
A. Copper. **B.** Zinc.
C. Sulphur. **D.** Magnesium.

2. The reaction in which vegetable oil is changed to margarine is called
A. dehydration. **B.** hydrogenation.
C. hydration. **D.** saponification.

3. Ethene was bubbled through a solution of bromine in tetrachloromethane. The structure of the compound formed is
A. **B.**
C. **D.**

4. Element X belongs to group II in the Periodic Table. The formula of the oxide of X is
A. XO. **B.** X_2O.
C. X_2O_3. **D.** XO_2.

5. The mass of potassium hydroxide, KOH, contained in 250cm^3 of 0.01 M of potassium hydroxide solution is (K=39; H=1; O=16)
A. 0.056 g. **B.** 0.140 g.
C. 0.280 g. **D.** 0.560 g.

6. Which one of the substances underlined in the equations below is being reduced?
A. $\underline{PbO_{(s)}} + H_{2(g)} \rightarrow Pb_{(s)} + H_2O_{(l)}$.
B. $\underline{2SO_{2(g)}} + O_{2(g)} \rightarrow 2SO_{3(g)}$.
C. $\underline{H_2S_{(g)}} + Cl_{2(g)} \rightarrow S_{(s)} + 2HCl_{(g)}$.
D. $\underline{2NH_{3(g)}} + 3CUO_{(s)} \rightarrow 3Cu_{(s)} + 3H_2O_{(l)} + N_{2(g)}$.

7. The number of particles in the nuclei of atoms Q, R, S and T are shown in the table below

Atom	Number of Particles	
	Protons + Neutrons	**Neutrons**
Q	40	20
R	40	22
S	45	24
T	45	25

Which of the atoms are isotopes?
A. Q and R. **B.** Q and T.
C. R and S. **D.** S and T.

8. A salt P reacted with concentrated sulphuric acid to give a colourless gas which fumed in moist air. The anion in P is likely to be a

A. nitrate. **B.** chloride.
C. sulphite. **D.** carbonate.

9. The breakdown of starch into glucose when heated in solution with dilute acid is known as

A. dehydration. **B.** fermentation.
C. hydrolysis. **D.** hydrogenation.

10. Which one of the graphs below shows the change in mass of calcium carbonate with time when it is reacted with hydrochloric acid?

A. (i). **B.** (ii).
C. (iii). **D.** (iv).

11. The reaction in which ethanol is changed to ethene when ethanol is reacted with excess concentrated sulphuric acid is called

A. hydrogenation. **B.** neutralisation.
C. hydration. **D.** dehydration.

12. Ethane burns in oxygen according to the following equation

$$2C_2H_6 + xO_2 \rightarrow yCO_2 + 6H_2O.$$

The values of x and y in the equation are

A. x=2 and y=2. **B.** x=7 and y=6.
C. x=7 and y=4. **D.** x=4 and y=6.

13. Which one of the following anions will react with silver nitrate solution to give a white precipitate soluble in excess aqueous ammonia?

A. Cl-. **B.** NO_3^-.

C. SO_4^{2-}. **D.** CO_3^{2-}.

14. Which one of the following oxides would dissolve in excess aqueous ammonia and in excess dilute sodium hydroxide solution?

A. FeO. **B.** ZnO.
C. CuO. **D.** PbO.

15. 10 g of a saturated sodium chloride solution was evaporated and 6 g of solid sodium chloride was left. The solubility of sodium chloride is

A. $(\frac{6x100}{10})$ **B.** $(\frac{6x100}{4})$

C. $(\frac{6x100}{16})$ **D.** $(\frac{10x100}{16})$

13. Which one of the following anions will react with silver nitrate solution to give a white precipitate soluble in excess aqueous ammonia?

A. Cl-. **B.** NO_3^-.

C. SO_4^{2-}. **D.** CO_3^{2-}.

14. Which one of the following oxides would dissolve in excess aqueous ammonia and in excess dilute sodium hydroxide solution?

A. FeO. **B.** ZnO.
C. CuO. **D.** PbO.

17. A compound contains Fe, 72.4% and O, 27.6%. (Fe=56= O=16). The empirical formula of X is given by the ratio

A. $(\frac{72.4}{72}) : (\frac{27.6}{72})$ **B.** $(\frac{72.4}{56}) : (\frac{27.6}{16})$

C. $(\frac{72.4x56}{100}) : (\frac{27.6x16}{100})$ **D.** $(\frac{56}{72.4}) : (\frac{16}{27.6})$

18. Which of the following salts is normally prepared by precipitation?
A. Calcium carbonate. **B.** Sodium sulphate.
C. Zinc chloride. **D.** Ammonium chloride.

19. Spring water decomposes on boiling to produce white solid particles. The solid particles are
A. calcium carbonate. **B.** calcium hydrogen carbonate.
C. calcium sulphate. **D.** calcium hydrogen sulphate.

20. Excess lead powder was shaken with an aqueous solution containing a mixture of copper (II) nitrate and magnesium nitrate. The cations present in the solution after the reaction were
A. Pb^{2+}, Cu^{2+} and Mg^{2+}. **B.** Pb^{2+} and Cu^{2+} only.
C. Mg^{2+} and Cu^{2+} only. **D.** Pb^{2+} and Mg^{2+} only.

21. Chlorine was exposed to sunlight as shown in the diagram below.
The gas collected in the test tube was
A. chlorine. **B.** hydrogen chloride.
C. oxygen. D. **hydrogen.**

22. A separating funnel is used in the laboratory to separate
A. sand from water. **B.** sulphur from iron.
C. water from ethanol. **D.** water from paraffin.

23. In the laboratory preparation of chloride, concentrated hydrochloric acid is heated with
A. manganese (IV) oxide. **B.** copper (II) chloride crystals.
C. sodium chloride crystals. **D.** lead (II) oxide.

24. Which one of the following gases turns moist potassium dichromate paper green?
A. Hydrogen. **B.** Sulphur dioxide.
C. Hydrogen chloride. **D.** Carbondioxide.

25. Which one of the following is **not** a property of **ethene**?
A. Ethene turns potassium permanganate colourless.
B. Ethene has a double and between carbon atoms.
C. Ethene undergoes addition reaction with bromine.
D. Ethene dissolves in water to form a basic solution.

26. When heated strongly, potassium nitrate decomposes according to the following equation

$$2KNO_{3(s)} \rightarrow 2KNO_{2(s)} + O_{2(g)}.$$

The volume of oxygen at s.t.p. that can be obtained by heating 5 g of potassium nitrate is

(K=39; O=16; N=14; 1 mole of a gas occupies 22.4 l at s.t.p.)

A. $(\frac{22.4x5}{202})$ **B.** $(\frac{5x202}{22.4})$
C. $(\frac{22.4x5}{101})$ **D.** $(\frac{5x101}{22.4})$

27. Which one of the following pairs of substances will react to form hydrogen?

A. Copper and dilute sulphuric acid.
B. Magnesium and dilute hydrochloric acid.
C. Copper (II) carbonate and dilute sulphuric acid.
D. Sodium sulphite and dilute hydrochloric acid.

28. Which one of the following cations would form a yellow precipitate when reacted with aqueous potassium iodine?
A. $Ca^{2+}_{(aq)}$. **B.** $Zn^{2+}_{(aq)}$.
C. $Fe^{2+}_{(aq)}$. **D.** $Pb^{2+}_{(aq)}$.

29. Sodium ethanoate, CH_3COONa, was dissolved in water. The resultant solution

A. bleached litmus paper. **B.** had no effect on litmus paper.
C. changed red litmus paper blue. **D.** changed blue litmus paper red.

30. Carbon burns in oxygen according to the following equation $C + O_2 \rightarrow CO_2$. The heat energy obtained when 480 g of carbon is burnt completely is (The molar heat of combustion of carbon is $2.2x10^{-7}$ kJ mol^{-1}; (C=12)

A. $8.8x10^{-5}$ kJ. **B.** $8.8x10^{-6}$ kJ.
C. $8.8x10^{-7}$ kJ. **D.** $4.4x10^{-6}$ kJ.

31. Metal M was dissolved in dilute nitric acid and the solution was evaporated to dryness and then heated strongly until there was no further change. The residue was yellow when hot and white on cooling. M is

A. zinc. **B.** lead.
C. aluminium. **D.** iron.

32. Air contains mainly

A. carbondioxide. **B.** oxygen.
C. nitrogen. **D.** water vapour.

33. Two gases which are evolved on heating copper (II) nitrate are

A. oxygen and nitrogen. **B.** oxygen and nitrogen dioxide.
C. oxygen and ammonia. **D.** ammonia and nitrogen dioxide.

34. When concentrated hydrochloric acid is reacted with potassium permanganate, the gas given off is

A. chlorine. **B.** hydrogen chloride.
C. hydrogen. **D.** oxygen.

35. Which one of the following properties is shown by carbon monoxide?

A. It burns with a blue flame. **B.** It turns limewater milky.
C. It turns blue litmus red. **D.** It is very soluble in water.

36. What would be observed if copper turnings were added to zinc sulphate solution?

A. A white precipitate is formed. **B.** Solution turns blue.
C. Copper is coated with zinc. **D.** Solution remains colourless.

37. Which of the following solutions would give the maximum volume of carbondioxide within the shortest time when reacted with 10 g of calcium carbonate at room temperature?

A. 30 cm^3 of 2M HCl. **B.** 60 cm^3 of 1M HCl.
C. 40 cm^3 of 2M HCl. **D.** 50 cm^3 of 1M HCl.

38. Excess hydrochloric acid was reacted with 1.95 g of zinc powder. The reaction proceeded according to the equation:

$$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}.$$

The maximum volume of hydrogen in cm^3, which was evolved at s.t.p. was

A. 672 **B.** 224
C. 448 **D.** 892

(Zn=65; molar volume=22400 cm at s.t.p.)

39. When elements X and Y are heated together they form a compound with the formula X_3Y_2. Elements X and Y have the following electronic structures respectively

A. 2:8:1 and 2:5 **B.** 2:8:2 and 2:4
C. 2:8:1 and 2:6 **D.** 2:8:2 and 2:5

*Each of the questions **40** to **43** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*

*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

40.

When liquid air is distilled oxygen comes off before nitrogen	**because**	nitrogen boils at lower temperature than oxygen.	

41.

When hydrogen is passed over heated copper (II) oxide there is no chemical change	**because**	Hydrogen is higher than copper in the activity series.	

42.

During formation of a chloride ion the chlorine atom attains the electronic configuration of a noble gas	**because**	noble gases have stable configurations.	

43.

Solid lead (II) bromide conducts electricity	**because**	the ions of solid lead (II) bromide are not able to move.	

*In each questions **44** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following:*

A. if 1, 2, 3 only are correct. *B. if 1, 3 only are correct*
C. if 2, 4 only are correct. *D. if 4 only is correct.*

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

44. Which of the following substances will sublime when heated?
1. Ammonium chloride. **2.** Iron (III) chloride.
3. Iodine. **4.** Sulphur.

45. Which one of the following gases will bleach moist litmus paper?
1. Oxygen. **2.** Chlorine.
3. Carbondioxide. **4.** Sulphur dioxide.

46. During electrolysis of copper (II) sulphate solution using copper electrodes,
1. copper is deposited at the cathode. **2.** oxygen is evolved at the anode.
3. the anode dissolves. **4.** the cathode dissolves.

47. Which of the following substances will dissolve in water to give a solution that will change blue litmus paper red?
1. Sodium ethanoate. **2.** Ammonium chloride.
3. Magnesium oxide. **4.** Carbondioxide.

48. Which of the following substances is/are decomposed by electric current?

1. solution of urea. **2.** aqueous sodium chloride.

3. molten wax. **4.** molten lead (II) bromide.

49. Which one of the following when in aqueous solution can be reduced by aluminium metal?

1. Fe^{2+}. **2.** Ca^{2+}.

3. Cu^{2+}. **4.** Mg^{2+}.

50. Which of the following substances would undergo permanent changes when strongly heated?

1. Iodine. **2.** Sugar.

3. Potassium carbonate. **4.** Potassium chlorate.

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545/1 CHEMISTRY PAPER 1 Oct./Nov. 1988 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

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*This paper consists of **50** objective-type questions.*
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*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*

1. Which one of the following mixtures can be separated by filtration?
A. Sugar and water.
B. Ink and water.
C. Sulphur and iron.
D. Sand and kerosene.

2. A solution of hydrogen chloride in dry methyl benzene will
A. form sodium chloride and water with sodium hydroxide.
B. liberate carbondioxide with sodium hydrogen carbonate.
C. liberate hydrogen with magnesium.
D. not conduct an electric current.

3. A compound Z when strongly heated leaves a residue which is yellow when hot and white when cold Z contains
A. Pb^{2+}.
B. Cu^{2+}.
C. Zn^{2+}.
D. Fe^{2+}.

4. When a solid was heated it changed to gas without passing through the liquid state. This change of state is called
A. vaporisation.
B. sublimation.
C. distillation.
D. condensation.

5. ionic compounds have high melting points because
A. ions strongly attract each other.
B. ions strongly repel each other.
C. they combine by transfer of electrons.
D. ions are arranged in a crystal lattice.

6. Sodium sulphite reacts with hydrochloric acid according to the equation:

$SO_{3\,(aq)}^{2-} + 2H^{+}_{(aq)} \rightarrow H_2O_{(l)} + SO_{2(g)}$.

20.0 cm^3 of sodium sulphite was neutralised exactly by 25.0 cm^3 of 0.05 M hydrochloric acid. The molarity of the sulphite was

A. $\frac{2x20.0x0.05}{25.0}$
B. $\frac{20.0x0.05}{2x25.0}$
C. $\frac{2x25.0x0.05}{20.0}$
D. $\frac{25.0x0.05}{2x20.0}$

7. Which of the following are the raw materials used to manufacture hydrogen gas on a large-scale?
A. Zinc and dilute sulphuric acid.
B. Iron and water.
C. Carbon and water.
D. Sodium and water.

8. Which one of the following methods is suitable for preparing anhydrous iron (III) chloride in the laboratory?
A. Pass dry chlorine over heater iron.
B. Pass dry hydrogen chloride over heated iron.
C. React iron with dilute hydrochloric acid and heat to dryness.
D. React iron (III) oxide with dilute hydrochloric acid and heat to dryness.

9. How many grams of pure sodium sulphate crystals, $Na_2SO_4.10H_2O$ (relative molecular mass=322) would be required to make $250cm^3$ of 0.01 M sodium sulphate solution?
A. 0.40 g.
B. 0.81 g.
C. 1.60 g.
D. 3.22 g.

10. Which one of the following is normally used to catalyse the oxidation of ammonia during the manufacture of nitric acid?
A. Platinised asbestos.
B. Finely divided iron.
C. Vanadium (V) oxide.
D. Iron (III) oxide.

11. Which one of the following substances will undergo a physical change when heated strongly?
A. Calcium nitrate.
B. Calcium hydroxide.
C. Sodium nitrate.
D. Sodium hydroxide.

12. When a solution X was reacted with aqueous sodium iodine, a yellow precipitate was formed. With ammonium hydroxide, solution X formed a white precipitate insoluble in excess alkali. X contained
A. Ca^{2+}.
B. Fe^{2+}.
C. Zn^{2+}.
D. Pb^{2+}.

13. Which one of the following substances is deliquescent?
A. Calcium hydroxide.
B. Sodium hydroxide.
C. Magnesium hydroxide.
D. Zinc hydroxide.

14. The mass of copper deposited from a solution of copper (II) chloride when a current of 1.2. A s passed for 3000 s is
A. $\frac{63.5x1.2x300}{2x96500}g$
B. $\frac{63.5x2x96500}{1.2x3000}g$
C. $\frac{3000x1.2x96500}{2x63.5}g$
D. $\frac{96500x2}{63.5x1.2x300}g$
(Cu=63.5; IF=96500 coulombs)

15. The formula of an oxide ion is O^{2-}. This shows that

A. the number of protons exceeds the number of electrons by two.
B. the number of electrons exceeds the number of protons by two.
C. oxygen atom loses two electrons to form O^{2-}.
D. the oxide ion has two electrons in its outermost shell.

16. The graph below represents the variation of the volume of oxygen with time when hydrogen peroxide decomposes in the presence of a catalyst.
****
PQ shows that
A. oxygen is being evolved at a constant rate.
B. decomposition is at its maximum.
C. decomposition has stopped.
D. the catalyst has all been used up.

17. Which one of the following methods would be suitable for preparing magnesium sulphate?
A. Direct combination.
B. Double decomposition.
C. Neutralisation.
D. Displacement of hydrogen by a metal.

18. Which one of the following metals combines directly with nitrogen?
A. Potassium.
B. Copper.
C. Calcium.
D. Zinc.

19. When calcium carbonate is heated, it decomposes according to the equation;
$Ca(HCO_3)_{2(s)} \rightarrow CaO_{(s)} + H_2O_{(l)} + 2CO_{2(g)}$.
27.0 g of the hydrogen carbonate was decomposed. The volume, in litres, of carbondioxide evolved at s.t.p. was

A. $\frac{27x22.4}{162}$
B. $\frac{162}{27x22.4}$
C. $\frac{2x27x22.4}{162}$
D. $\frac{162}{2x27x22.4}$
(H=1; C=12; O=16; Ca=40; 1 mole of gas occupies 22.4 dm^3 at s.t.p.)

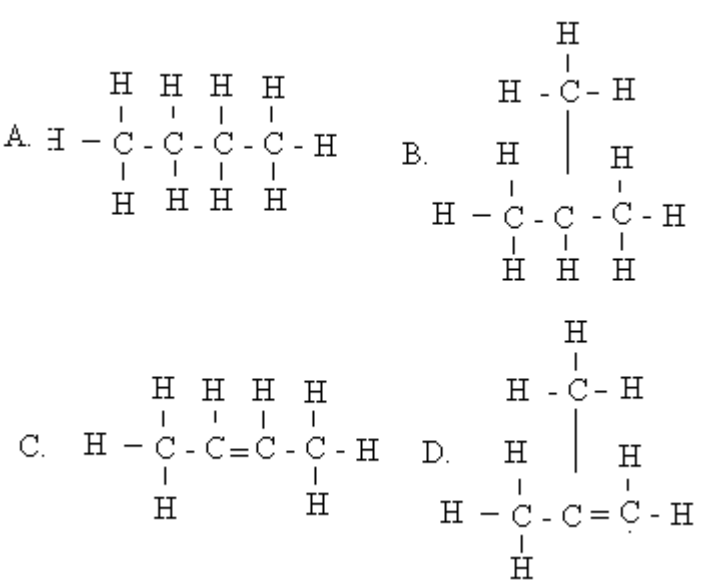
20. The reaction in which soap is manufactured from oils and fats is known as
A. fermentation.
B. hydrogenation.
C. polymerisation.
D. saponification.

21. A compound contains 92.3% carbon and 7.7% hydrogen by mass. What is the empirical formula of the compound?
(C=12; H=1)
A. C_2H.
B. CH_2.
C. C_2H_2.
D. CH.

22. A solution of salt Y formed a white precipitate when dilute nitric acid was added followed by silver nitrate solution. Y contained
A. CO_3^{2-}.
B. SO_4^{2-}.
C. Cl^-.

D. NO_3^-.

23. Which one of the following is the structural formula of butane?



24. What is the percentage of nitrogen in calcium nitrate, $Ca(NO_3)_2$?
(N=14; O=16; Ca=40)

A. $\frac{14x100}{164}$

B. $\frac{62x100}{164}$

C. $\frac{28x100}{164}$

D. $\frac{124x100}{164}$

25. When pollen grains are placed in water in tough and observed under a microscope, the grain particles will be seen to

A. all remain stationary.
B. all move randomly.
C. stick together in cluster.
D. all move in one direction.

26. Which one of the following is an electrovalent compound?

A. Calcium oxide.
B. Sulphur dioxide.
C. Hydrogen chloride.
D. Phosphorus (III) chloride.

27. Which one of the following substances will dissolve in water to give a solution with pH greater than 7?

A. Sodium hydrogen carbonate.
B. Ammonium sulphate.
C. Sulphur dioxide.
D. Carbondioxide.

28. The atomic number of element Y is 19. The formula of its chloride is

A. YCl_2.
B. Y_2Cl.
C. YCl.
D. Y_2Cl_3.

29. Which one of the following mixtures can be separated by shaking with excess water and filtering?

A. Sodium sulphate and sodium carbonate.
B. Copper (II) oxide and copper (II) chloride.
C. Calcium nitrate and calcium chloride.
D. Potassium permanganate and potassium sulphate.

30. Which one of the following nitrates does **not** give off oxygen when strongly heated?
A. $Ca(NO_3)_2$.
B. $Zn(NO_3)_2$.
C. KNO_3.
D. NH_4NO_3.

31. Which one of the following does **not** involve a change in mass when heated in air?
A. Potassium permanganate.
B. Copper (II) hydroxide.
C. Zinc oxide.
D. Copper.

32. Methane burns in oxygen according to the equation:
$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$.
The volume of oxygen required for complete combustion of $15cm^3$ of methane is (all volumes measured at constant temperature and pressure),
A. 10 cm^3.
B. 20 cm^3.
C. 30 cm^3.
D. 40 cm^3.

33. The number of neutrons in the nucleus of the atom $^{70}_{29}X$ is

A. 99
B. 70
C. 41
D. 29

34. Which one of the following is observed when aqueous barium chloride is added to iron (II) sulphate solution?
A. A green precipitate.
B. A white precipitate.
C. A blue precipitate.
D. A brown precipitate.

35. Which one of the following pairs of compounds can cause temporary hardness of water?

A. Sodium hydrogen carbonate and magnesium hydrogen carbonate.
B. Sodium hydrogen carbonate and magnesium hydrogen carbonate.
C. Potassium hydrogen carbonate and calcium hydrogen carbonate.
D. Magnesium hydrogen carbonate and calcium hydrogen carbonate.

36. Which one of the following is **not** an aqueous for an oxidation reduction reaction?
A. $3CuO_{(s)} + 2NH_{3(g)} \rightarrow 3Cu_{(s)} + 3H_2O_{(l)} + N_{2(g)}$.
B. $MgO_{(s)} + H_2SO_{4(aq)} \rightarrow MgSO_{4(aq)} + H_2O_{(l)}$.
C. $MnO_{2(s)} + 4HCl_{(aq)} \rightarrow MnCl_{2(aq)} + 2H_2O_{(l)} + Cl_{2(g)}$.
D. $2Mg_{(s)} + CO_{2(g)} \rightarrow 2MgO_{(s)} + C_{(s)}$.

37. Which one of the following hydroxides is soluble in aqueous ammonia but not in sodium hydroxide solution?

A. $Zn(OH)_2$.
B. $Cu(OH)_2$.
C. $Pb(OH)_2$.
D. $Ca(OH)_2$.

38. Calcium hydroxide reacts with ammonium chloride according to the equation:

$Ca(OH)_{2(s)} + 2NH_4Cl_{(s)} \rightarrow CaCl_{2(s)} + 2H_2O_{(l)} + 2NH_{3(g)}$.
If 14.8 g of calcium hydroxide was reacted completely with ammonium chloride, what mass of ammonia gas would be evolved?

(H=1; N=14; O=16; Ca=40)

A. 1.7 g.
B. 3.4 g.
C. 6.8 g.
D. 9.0 g.

39. Which one of the following equations represents a neutralisation reaction between an acid and alkali?

A. $2H^+_{4\,(aq)} + CO^{2-}_{3\,(s)} \rightarrow CO_{2(g)} + H_2O_{(l)}$.

B. $2NH^+_{4\,(aq)} + CO^{2-}_{3\,(aq)} \rightarrow (NH_4)_2CO_{3(aq)}$.

C. $NH^+_{4\,(aq)}\,OH_{(aq)} \rightarrow NH_{3(g)} + H_2O_{(l)}$.

D. $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$.

40. Which one of the following properties is **not** true about carbon monoxide?
A. It is colourless.
B. It is acidic.
C. It is poisonous.
D. It is a reducing agent.

*Each of the questions **41** to **42** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

41.

Ethene does **not** react with bromine	**because**	ethene contains a double bond between two carbon atoms.	☐

42.

During industrial conversion of sulphur dioxide to sulphur trioxide platinised asbestos is used	**because**	platinised asbestos increases rate of formation of sulphur trioxide.	☐

*In each questions **43** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following:*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

43. In an experiment an apparatus was set up as shown in the diagram below. After sometime a white appeared at point R.
****
This experiment shows that
1. ammonia is lighter than hydrogen chloride.
2. ammonia is basic and hydrogen chloride is acidic.
3. ammonia and hydrogen chloride particles are volatile.
4. hydrogen chloride is lighter than ammonia.

44. When copper (II) nitrate crystals are heated strongly the following substance(s) is/are produced.
1. Oxygen gas.
2. Water vapour.
3. Copper (II) oxide.
4. Copper metal.

45. Which of the following is/are true about a solution of sodium carbonate in water?
1. It produces carbondioxide when heated.
2. It reacts with acids with effervescence.
3. It can be used in the purification of water.
4. It turns red litmus blue.

46. The following is/are characteristics of metals:
1. conduct electricity.
2. conduct heat.
3. their atoms form cations.
4. their atoms form anions.

47. When sugar is warmed with concentrated sulphuric acid
1. carbon is formed.
2. sulphur dioxide is formed.
3. sugar is dehydrated.
4. sugar is oxidised.

48. An element belongs to the halogen group in the Periodic Table but below iodine. The element is likely to be
1. coloured.
2. diatomic.
3. a solid at room temperature.
4. a liquid at room temperature.

49. Which of the following solutions contains(s) the same number of hydrogen ions?
1. 1 l of 1 M H_2SO_4.
2. 1 l of 2 M HCl.
3. 2 l of 1 M HNO_3.
4. 2 l of 2 M HBr.

50. The atoms of the same element have the
1. same number of protons as ^{12}C.
2. same number of protons.
3. same number of electrons as ^{12}C.
4. same number of electrons.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1989 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*Electronic calculators must **not** be used.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*

1. The reaction in which soap is manufactured from oils and fats known as
A. fermentation.
B. hydrogenation.
C. polymerisation.
D. saponification.

2. 45 kJ of energy is produced when 3 g of butter is oxidised in the body. The energy produced in the body of a person who eats 1 g of butter daily for one week is
A. 1050 kJ.
B. 105 kJ.
C. 15 kJ.
D. 10.5 kJ.

3. Which one of the following nitrates does **not** give off oxygen when heated?
A. Zinc nitrate.
B. Sodium nitrate.
C. Ammonium nitrate.
D. Calcium nitrate.

4. Which one of the following salts can be prepared by precipitation?
A. Calcium sulphite.
B. Copper (II) chloride.
C. Lead (II) nitrate.
D. Sodium chloride.

5. Which one of the following reagents can be used to differentiate between lead (II) and aluminium ions in aqueous solution?
A. $NaOH_{(aq)}$.
B. $Kl_{(aq)}$.
C. $NH_{3(aq)}$.
D. $HNO_{3(aq)}$.

6. Which one of the following hydroxides when strongly heated produces a yellow solid on cooling?

A. $Cu(OH)_2$.
B. $Zn(OH)_2$.
C. $Pb(OH)_2$.
D. $Fe(OH)_2$.

7. Which one of the following compounds does **not** give off carbon dioxide when strongly heated?
A. Sodium carbonate.
B. Calcium carbonate.
C. Calcium hydrogen carbonate.

D. Sodium hydrogen carbonate.

8. Which one of the following oxides can be reduced by carbon monoxide?
A. MgO.
B. CaO.
C. CuO.
D. K_2O.

9. Propane burns in oxygen according to the following equation:
$C_3H_{8(g)} + 5O_{2(g)} \rightarrow 4H_2O_{(g)} + 3CO_{2(s)}$.
The volume of oxygen required for complete combustion of 10 dm^3 of propane is
A. 75 dm^3.
B. 50 dm^3.
C. 25 dm^3.
D. 15 dm^3.

10. The solubility curve for potassium nitrate is shown in figure 1.

The mass of potassium nitrate which would dissolve in 25 g of water at 30^oC is
A. 0.6 g.
B. 1.2 g.
C. 6.0 g.
D. 12.0 g.

11. Which one of the following is a basic oxide?
A. $SO_{2.}$
B. ZnO.
C. $P_2O_{5.}$
D. CaO.

12. The diagram in figure 2 shows the arrangement of the apparatus which was set up to produce a chloride of iron. The product formed was
A. hydrated iron (II) chloride.
B. hydrated iron (III) chloride.
C. anhydrous iron (II) chloride.
D. anhydrous iron (III) chloride.

13. 25.0 cm^3 of 0.1 m sodium carbonate was found to require 23.5 cm^3 of hydrochloric acid to be completely neutralised. The molarity of hydrochloric acid is
A. $\frac{23.5x0.1}{25.0x2}$
B. $\frac{2x23.5x0.1}{25.0}$
C. $\frac{2x25.0}{23.5x0.1}$
D. $\frac{2x25.0x0.1}{23.5}$

14. Alkanes are hydrocarbons with the general formula
A. C_nH_{2n+2}.
B. C_nH_{2n}.
C. C_nH_n.
D. C_nH_{2n-2}.

15. Which one of the following oxides can be reduced by ammonia?
A. Zinc oxide.
B. Copper (II) oxide.
C. Magnesium oxide.
D. Iron (II) oxide.

16. Ammonium chloride, NH_4Cl was dissolved in water. The resultant solution

A. had no effect on litmus paper.
B. changed red litmus paper blue.
C. changed blue litmus paper red.
D. bleached litmus paper.

17. Beginning with the least reactive, the order of reactivity of the following metals with dilute hydrochloric acid is
A. iron, aluminium, lead, zinc.
B. zinc, lead, aluminium, iron.
C. lead, iron, zinc, aluminium.
D. aluminium, zinc, iron, lead.

18. Calcium reacts with water according to the following equation:
$Ca_{(s)} + 2H_2O_{(l)} \rightarrow Ca(OH)_{2(aq)} + H_{2(g)}$.
The volume of hydrogen formed when 0.3 mole of calcium reacts with water at 25°C is
(1 mole of gas occupies 24dm^3 at 25°C)
A. 0.72 dm^3.
B. 7.2 dm^3.
C. 72 dm^3.
D. 720 dm^3.

19. How many grams of sodium hydroxide are present in 250cm^3 of a 2M solution?
(Na=23; O=16; H=1)
A. 10 g.
B. 20 g.
C. 40 g.
D. 80 g.

20. The atomic numbers of an element is
A. the number of electrons and protons.
B. the number of protons and neutrons.
C. the number of neutrons.
D. the number of protons.

21. 10 amps of current was passed through silver nitrate solution for one minute. The mass of silver deposited at the cathode is
(Ag=108; Faraday's constant= 96,500 coulombs)
A. $\frac{96{,}500x60x10}{108}g$
B. $\frac{10x108}{96{,}500x60}g$
C. $\frac{10x60x108}{96{,}500}g$
D. $\frac{10x60}{96{,}500x108}g$

22. Potassium hydrogen carbonate is decomposed by heat to potassium carbonate. The mass of potassium carbonate produced on heating 5 g of potassium hydrogen carbonate is (K=39; C=12; H=1; O=16)
A. $\frac{138x5}{200}$
B. $\frac{138x5}{100}$
C. $\frac{200x5}{138}$
D. $\frac{100x5}{138}$

23. The number of moles of nitrogen molecules in 42 g of nitrogen is
(N=14)
A. 0.33
B. 0.67
C. 1.50

D. 3.00

24. The atomic numbers of elements X and Y are 7 and 9 respectively. The formula of the compounds formed between X and Y is
A. XY_3.
B. XY_2.
C. X_3Y.
D. X_2Y.

25. Isotopes are different atoms of the same element with the
A. same number of protons, neutrons and electrons.
B. same number of electrons and neutrons but different number of protons.
C. same number of protons and neutrons but different number of electrons.
D. same number of protons and electrons but different number of neutrons.

26. Which one of the following substances does **not** conduct electricity?
A. Graphite.
B. Diamond.
C. Lead.
D. Zinc.

27. If a solution containing 1M copper (II) sulphate and 1M zinc sulphate is electrolysed, the substance formed at the cathode is

A. oxygen.
B. hydrogen.
C. copper.
D. zinc.

28. When a gas X with a pungent smell was passed over hot platinum foil a colourless gas Y was formed. Gas Y turned brown on mixing with air. Gas X is most likely to be
A. sulphur dioxide.
B. ammonia.
C. hydrogen sulphite.
D. nitrogen monoxide.

29. How many electrons are there in oxygen (O^{2-}) ions?
(The atomic number of oxygen is 8)
A. 6.
B. 8.
C. 10.
D. 16.

30. Which one of the following gases will not reduce copper (II) oxide to copper?
A. Hydrogen.
B. Carbon monoxide.
C. Ammonia.
D. Carbondioxide.

31. An atom of an element X has 19 electrons. In the Periodic Table X belong to
A. group I.
B. group II.
C. group III.
D. group IV.

32. During quantitative determination of the ratio of oxygen to nitrogen in air by the action of air hot copper, the gas collected in the evacuated flask is mainly
A. nitrogen.
B. oxygen.
C. carbondioxide.

D. water vapour.

33. Which one of the following is formed when hydrogen sulphate is bubbled through hydrogen peroxide?
A. SO_4^{2-}.
B. SO_3.
C. SO_2.
D. S.

34. Solid X is insoluble in water but dissolves in nitric acid to form a colourless solution. When the solution was treated with aqueous sodium hydroxide a white precipitate insoluble in excess alkali was formed. X is
A. potassium carbonate.
B. calcium carbonate.
C. zinc carbonate.
D. lead carbonate.

35. Which one of the following gases decolourises aqueous potassium permanganate?

A. NO_2.
B. NH_3.
C. SO_2.
D. HCl.

36. An atom $^{41}_{20}M$ forms a chloride of the formula MCl_2. Which one of the following atoms forms a chloride with similar formula?
A. $^{25}_{12}R$.
B. $^{25}_{13}T$.
C. $^{21}_{10}Y$.
D. $^{22}_{11}Z$.

37. In the order of the reactivity of the elements K, Na, Mg, Al, C, Zn and Cu, potassium is the most reactive and lead is the least reactive. Which one of the following reaction is possible?

A. $2Na_2O_{(s)} + C_{(s)} \xrightarrow{heat} 4Na_{(s)} + CO_{2(g)}$.
B. $2MgO_{(s)} + C_{(s)} \xrightarrow{heat} 2Mg_{(s)} + CO_{2(g)}$.
C. $Mg_{(s)} + CuO_{(s)} \xrightarrow{heat} MgO_{(s)} + Cu_{(s)}$.
D. $2Al_{(s)} + 3K_2O_{(s)} \xrightarrow{heat} Al_2O_{3(s)} + 6K_{(s)}$.

38. 15.00 cm^3 of a 0.1 M solution of an acid was completely neutralised by 45.00 cm^3 of a 0.1 M sodium hydroxide solution. The basicity of the acid is
A. 1
B. 2
C. 3
D. 4

39. Which one of the following is the molecular formula of ethene?
A. C_2H_4.
B. C_2H_6.
C. C_4H_6.
D. C_3H_8.

40. Compound R contains 15.8% of X and 84.2% of Y. The empirical formula of R is
A. XY_3.
B. X_2Y.
C. XY_2.

D. X_3Y.
(X=12; Y=32)

*Each of the questions **41** to **44** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True statement.

41.

Complete combustion of ethanol and fermentation of glucose are similar processes	**because**	in both processes a gas that turns limewater milky is produced.	

42.

Sulphur dioxide is an acid anhydride	**because**	it dissolves in water.	

43.

Carbon reacts with nitric acid	**because**	carbon is an oxidising agent.	

44.

Elements of group I of the Periodic Table are very electropositive	**because**	their outermost shell electrons are not strongly attracted by the nucleus.	

*In each questions **45** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following:*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

45. Chlorine gas can be obtained in the laboratory by

1. heating a mixture of manganese (IV) oxide and concentrated hydrochloric acid.

2. adding concentrated hydrochloric acid to lead (II) oxide.
3. the action of concentrated hydrochloric acid on potassium permanganate crystals.
4. adding concentrated sulphuric acid to sodium chloride.

46. Which of the following may be observed if copper (II) sulphate crystals are heated strongly?
1. water vapour is produced.
2. A black residue is obtained.
3. The crystals turn white.
4. Brown fumes are produced.

47. Hydrogen gas
1. is neutral to litmus solution.
2. is a reducing agent.
3. burns in air.
4. is soluble in water.

48. Which of the following ions can cause hardness in water?
1. Mg^{2+}.
2. Fe^{2+}.
3. Ca^{2+}.
4. Pb^{2+}.

49. Red hot zinc reacts with steam to form
1. water and hydrogen.
2. zinc oxide.
3. zinc hydroxide.
4. hydrogen.

50. The yield of sulphuric acid in the Contact process is increased by
1. increasing pressure.
2. the presence of vanadium (V) oxide.
3. using high temperature.
4. using excess oxygen.

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Go to Index | E-mail Designer | FAQs

545/1
CHEMISTRY
PAPER 1
Nov./Dec. 1990
1½ **hours**

UGANDA NATIONAL EXAMINATION BOARD
Uganda Certificate of Education
CHEMISTRY
Paper 1
Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*

1. A separating funnel can be used to separate a mixture of water and petrol because the two liquids
A. are miscible.
B. are immiscible.
C. have different densities.
D. have different boiling points.

2. To a solution containing calcium ions was added to sodium carbonate solution followed by dilute hydrochloric acid. Which one of the following best describes what was observed?
A. A white precipitate was formed.
B. A white precipitate was formed and later dissolved.
C. A white precipitate was formed but dissolved later with effervescence.
D. Effervescence occurred and a colourless gas was evolved.

3. Which one of the following substances would form a solution in water which is acidic to litmus?
A. NH_4Cl.
B. NaCl.
C. Na_2CO_3.
D. CH_3COONa.

4. The number of moles of sodium ions contained in $100cm^3$ of 2M solution of sodium carbonate is
A. 0.2
B. 0.4
C. 2.0
D. 4.0

5. Which one of the following substances is the best conductor electricity?
A. Aqueous ethanoic acid.
B. Solid lead (II) chloride.
C. Aqueous ammonia.
D. Dilute sulphuric acid.

6. When sodium nitrate is heated it gives

A. nitrogen dioxide.
B. sodium oxide and nitric oxide.
C. oxygen.
D. oxygen and nitrogen dioxide.

7. Which of the following substances has a giant ionic structure?
A. Iodine.
B. Graphite.
C. sodium chloride.
D. Hydrogen chloride.

8. What volume of a 0.2 M sodium hydroxide solution would be required to completely precipitate iron (III) hydroxide from $2cm^3$ of a 0.1 M solution of iron (III) ions?
A. 0.5
B. 1.0
C. 2.0
D. 3.0

9. Which one of the following solutions reacts with marble chips to liberate carbondioxide? A solution of
A. tartaric acid in methylbenzene.
B. tartaric acid in water.
C. hydrogen chloride in benzene.
D. hydrogen chloride in methylbenzene.

10. Which one of the following is formed at the anode when an aqueous solution of copper (II) sulphate is electrolysed between two carbon electrodes?
A. SO_2.
B. H_2.
C. Cu.
D. O_2.

11. Ammonia solution was added dropwise to a solution of Fe^{2+} ions until the ammonia was in excess. What was observed?
A. A green precipitate.
B. A green precipitate soluble in excess ammonia.
C. A reddish brown precipitate.
D. A reddish brown precipitate soluble in excess ammonia.

12. A colourless gas was found to decolourise aqueous potassium manganese (VII) solution, but had no effect on moist litmus paper. The gas is

A. sulphur dioxide.
B. ethene.
C. hydrogen chloride.
D. hydrogen.

13. which one of the following combinations would produce oxygen the fastest rate?
A. $100cm^3$ OF 2M H_2O_2 heated to 30^oC.
B. A mixture of 1 g of MnO_2 and $100cm^3$ of 2M H_2O_2 at room temperature.
C. $100cm^3$ of 1M H_2O_2 heated to 30^oC.
D. A mixture of $100cm^3$ of 2M H_2O_2 and 0.5 g of MnO_2 to 30^oC.

14. Which one of the following properties in **not** shown by group III elements? They
A. are all non-metals.
B. are all gases at room temperature.
C. all form ionic compounds with group I elements.
D. all form diatomic molecules.

15. Which one of the following is **not** a large-scale use of chlorine?
A. Manufacture of bleaching powder.
B. Purification of drinking water.
C. Electrolysis of sodium chloride.
D. Manufacture of plastics.
16. Which one of the following is **not** a property of aqueous nitrogen chloride solution? It
A. gives a white precipitate with aqueous Ag^+ ions.
B. liberates HCl gas on heating.
C. has a pH less than 7.
D. is a proton donor.

17. Concentrated nitric acid was added to an aqueous solution of iron (II) sulphate. What was observed?
A. A brown ring.
B. A pale yellow solution.
C. A green precipitate.
D. A green solution.

18. Lead (II) chloride can be prepared in the laboratory by the action of hydrochloric acid on
A. lead metal.
B. lead (II) oxide.
C. lead (II) carbonate.
D. Lead (II) nitrate.

19. The process by which water vapour is changed into dew is called
A. distillation.
B. efflorescence.
C. condensation.
D. evaporation.

20. Sulphur dioxide is normally prepared in the laboratory by
A. heating a mixture of dilute sulphuric acid and sodium sulphite.
B. heating a mixture of concentrated sulphuric acid and sodium sulphite.
C. reacting sodium sulphite with dilute sulphuric acid in the cold.
D. reacting sodium sulphite with concentrated sulphuric acid in the cold.

21. Atoms of elements in the same group in the Periodic Table have the same number of
A. outer shell electrons.
B. electrons outside the nucleus.
C. protons in the nucleus.
D. neutrons in the nucleus.

22. When heated, calcium carbonate decomposes according to the equation
$CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$.
The loss in mass of calcium carbonate when 40 g of the carbonate is heated to constant mass is

(Ca=40; O=16; C=12)

A. $\frac{100-40}{44}$

B. $\frac{40x44}{100}$

C. $\frac{100-44}{40}$

D. $\frac{100x40}{44}$

23. A metal normally reacts with dilute mineral acids to give
A. the oxide of the metal and hydrogen.
B. a salt of metal and water.
C. he hydroxide of the metal and hydrogen.
D. a salt of the metal and hydrogen.

24. Which one of the following carbonates is soluble in water?
A. Ammonium carbonate.
B. Lead (II) carbonate.
C. Zinc carbonate.
D. Magnesium carbonate.

25. Which one of the following represents a reduction-oxidation reaction?
A. $2NaOH_{(aq)} + CuCl_{2(aq)} \rightarrow Cu(OH)_{2(s)} + 2NaCl_{(aq)}$.
B. $2FeCl_{2(aq)} + Cl_{2(g)} \rightarrow 2FeCl_{3(aq)}$.
C. $2NaOH_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2H_2O_{(l)}$.
D. $ZnCO_{3(s)} + 2HNO_{3(aq)} \rightarrow Zn(NO_3)_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$.

26. Which one of the following hydroxides will dissolve in excess aqueous ammonia?
A. $Pb(OH)_2$.
B. $Al(OH)_3$.
C. $Zn(OH)_2$.
D. $Fe(OH)_3$.

27. Sulphuric acid reacts with sodium hydroxide according to the following equation:

$2NaOH_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2H_2O_{(l)}$.

The maximum volume of 0.1 M sulphuric acid required to react completely with $10cm^3$ of 0.5M sodium hydroxide is

A. 10 cm^3.
B. 20 cm^3.
C. 25 cm^3.
D. 50 cm^3.

28. An atom of an element has the structure $^{20}_{10}X$. The element
A. forms covalent bonds readily with non-metals.
B. forms ionic bonds with non-metals.
C. belongs to group II pf the Periodic Table.
D. has full shells of electrons.

29. The percentage of oxygen in baking powder, $NaHCO_3$, is
(Na=23; H=1; C=12; O=16)
A. $\frac{48x100}{84}$
B. $\frac{16x100}{84}$
C. $\frac{16x100}{102}$
D. $\frac{48x100}{102}$

30. Which one of the following sets of elements are arranged in the correct order of reactivity, beginning with the least reactive?
A. Magnesium, hydrogen, copper.
B. Hydrogen, copper, magnesium.
C. Copper, hydrogen, magnesium.
D. Hydrogen, magnesium, copper.

31. During the preparation of hydrogen from zinc and hydrochloric acid, the rate of reaction is increased by
A. heating the mixture strongly.
B. adding copper (II) sulphate to the mixture.

C. adding copper (II) oxide to the mixture.
D. adding manganese (IV) oxide to the mixture.

32. Barium carbonate reacts with dilute acids according to the equation:
$BaCO_{3(s)} + 2H^{+}_{(aq)} \rightarrow Ba^{2+}_{(aq)} + H_2O_{(l)} + CO_{2(g)}$.
The maximum volume of carbondioxide that would be evolved on reacting 2.0 g of barium carbonate with excess dilute hydrochloric acid at s.t.p. is

($BaCO_3$=197; The molar gas volume at s.t.p.=22.4 dm^3)
A. 112 cm^3.
B. 224 cm^3.
C. 227 cm^3.
D. 448 cm^3.

33. Sodium hydrogen carbonate and sodium carbonate occur in solution in Lake Magadi. The two salts are separated by a method known as
A. fractional distillation.
B. fractional crystallisation.
C. evaporation.
D. chromatography.

34. The ion formed by the element X of atomic number 13 is
A. X^{3+}.
B. X^{2+}.
C. X^{2-}.
D. X^{3-}.

*Each of the questions **35** to **40** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side. Select:*

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True statement.

35.

An impure sample of iodine can be purified by sublimation	**because**	iodine is a volatile substance.	

36.

Diamond conducts electricity	**because**	Diamond has a giant reducing agent.	

37.

Chlorine bleaches moist litmus paper	**because**	chlorine is a reducing agent.	

38.

When hot platinum wire is brought into contact with ammonia vapour in air, the platinum wire glows red	**because**	platinum catalyses the oxidation of ammonia.	

39.

Sodium and potassium belong to group I in the Periodic Table	**because**	sodium and potassium are both reactive metals.	

40.

Hydrogen can be collected by upward displacement of air	**because**	hydrogen is less dense than air.	

*In each questions **41** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following:*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

41. Which of the following would be formed when anhydrous copper (II) carbonate is heated strongly?
1. A white solid.
2. A black solid.
3. Oxygen.
4. Carbondioxide.

42. When sulphur dioxide is prepared through sodium hydroxide solution for a long time, which one of the following products are formed?
1. Sodium sulphate.
2. Sodium sulphite.
3. Sodium hydrogen sulphate.
4. Sodium hydrogen sulphite.

43. Which of the following will take place when a piece of burning phosphorus is lowered into a gas jar of oxygen?
1. The phosphorus burns with a bright flame.
2. There is an increase in weight.
3. An acid anhydride is formed.
4. A colourless gas is formed.

44. Which of the following gases cannot be dried using concentrated sulphuric acid?
1. Hydrogen sulphide.
2. Hydrogen chloride.
3. Ammonia.
4. Sulphur dioxide.

45. A compounds
1. can have a varying composition.
2. can only be decomposed by chemical changes.
3. has properties which are the sum of the properties of its constituents.
4. contains elements which are chemically combined together.

46. Which of the following can affect the rate of reaction of gases?
1. Size of the molecules.
2. Temperature.
3. Surface area.
4. Pressure.

47. Which of the following ions will form a precipitate with soap solution?

1. HCO_3^-.

2. NH_4^+.

3. SO_4^{2-}.

4. Mg^{2+}.

48. Which of the following are observed when potassium metal is put in water?
1. The metal reacts violently and catches fire.
2. The metal floats but moves about the water surface.
3. The resultant solution turns litmus blue.
4. Bubbles of a gas can be seen.

49. Which of the following solutions contain the same concentration of H^+ ions?
1. 1 litre of 1M H_2SO_4.
2. 2 litres of 1M HCl.
3. 1 litre of 2M HCl.
4. 1 litre of 2M H_2SO_4.

50. When a solution of copper (II) sulphate is electrolysed using copper electrodes
1. the anode loses weight.
2. the colour of the solution remains the same.
3. the cathode gains weight.
4. the solution turns to colourless eventually.

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Go to Index | E-mail Designer | FAQs

545/1
CHEMISTRY
PAPER 1
Nov./Dec. 1991
1½ **hours**

UGANDA NATIONAL EXAMINATION BOARD
Uganda Certificate of Education
CHEMISTRY
Paper 1
Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*

1. Which one of the following mixtures is best separated by chromatography?
A. Ink.
B. Crude petroleum.
C. Water and oil.
D. Water and ethanol.

2. which one of the following oxides is soluble in excess sodium hydroxide solution and in excess aqueous ammonia?
A. PbO.
B. ZnO.
C. Al_2O_3.
D. Fe_2O_3.

3. Which one of the following gases is a major sewerage product?
A. N_2.
B. ZnO.
C. Al_2O_3.
D. Fe_2O_3.

4. The volume of 0.01 M sodium hydroxide solution which is required to react exactly with 25.0 cm^3 of 0.02 M hydrochloric acid is
A. 12.5 cm^3.

B. 25.0 cm^3.
C. 50.0 cm^3.
D. 75.0 cm^3.

5. Solution X forms a white precipitate with silver nitrate solution. The precipitate is insoluble in nitric acid. X is likely to contain
A. SO_4^{2-}.
B. Cl^-.
C. NO_3^-.
D. CO_3^{2-}.

6. Which one of the following reactions does not normally require a catalyst?

A. Production of oxygen from hydrogen peroxide.
B. Synthesis of sulphur trioxide from sulphur dioxide and oxygen.
C. Synthesis of ammonia from nitrogen and hydrogen.
D. Production of chlorine from manganese (IV) oxide and concentrated hydrochloric acid.

7. Which one of the following substances has a giant atomic structure?
A. Sulphur.
B. Iodine.
C. Diamond.
D. Phosphorus.

8. The mass of nitric acid (HNO_3) required to make 200cm^3 of a 2M solution is
A. 31.5 g.
B. 25.2 g.
C. 15.8 g.
D. 12.6 g.

9. Which one of the following set up of apparatus can be used for the preparation of ammonia solution?
A.
B.
C.
D.

10. Which one of the following nitrates does not give off brown fumes when heated?
A. $Mg(NO_3)_2$.
B. $NaNO_3$.
C. $Ca(NO_3)_2$.
D. $Ba(NO_3)_2$.

11. Which one of the following is an electronic configuration of an atom of an inert gas?
A. 2:8:8
B. 2:8:7
C. 2:8:6
D. 2:8:8:1

12. Copper (II) carbonate when heated in air decomposes according to the equation
$CuCO_{3(s)} \rightarrow CuO_{(s)} + CO_2$.
What volume of carbondioxide is produced at s.t.p. when 0.5 mole of copper (II) oxide is formed?
(Cu=64; O=16; 1 mole of gas at s.t.p. occupies 22.4 l)
A. 112.0 l
B. 44.0 l
C. 22.4 l
D. 11.2 l

13. The number of neutrons in the nucleus of an atom, $^{37}_{17}X$ is

A. 17.
B. 20.
C. 37.
D. 54.

14. An oxide of metal Z reacts with magnesium when heated but it does not react with copper. The order of reactivity of Z, magnesium and copper starting with them most reactive is
A. Cu, Z, Mg.
B. Z, Mg, Cu.
C. Mg, Cu, Z.
D. Mg, Z, Cu.

15. Which one of the following formulae represents an alkali?
A. C_3H8.
B. C_3H_6.
C. C_2H_2.
D. C_2H_6.
16. 5.3 kJ of hear energy are required to vaporise 13 g of liquid of relative molecular mass 78.
The heat of vaporisation of the liquid in kJ mol^{-1} is
A. 78.0
B. 68.9
C. 31.8
D. 11.3
17. Which one of the following substances sublimes when heated?
A. ZnO.
B. $CaCl_2$.
C. I_2.
D. P.
18. Hot excess concentrated sulphuric acid reacts with ethanol to give a gas which decolourises bromine water. The gas is
A. methane.
B. ethene.
C. ethyne.
D. ethane.

19. The atomic numbers of elements Q, R, S, T are 8, 9, 13 and 17 respectively. Which one of the following pairs of elements belong to the same group in the Periodic Table?
A. Q and R.
B. Q and S.
C. R and T.
D. S and T.

20. Which one of the following salts can be prepared by neutralisation?
A. $CaSO_4$.
B. $PbSO_4$.
C. $ZnSO_4$.
D. $(NH_4)_2SO_4$.
21. The mass of copper deposited when 240 coulombs of electricity is used in the electrolysis of copper (II) sulphate is
A. $(\frac{240x64}{2x96,500})$
B. $(\frac{64x96,500}{2x240})$
C. $(\frac{240x2x64}{96,500})$
D. $(\frac{2x96,500}{240x64})$
(Cu=64; F=96,500 C)

22. Which one of the following compounds dissolves in water to give a solution with a pH greater than 7?
A. CH_3COONa.
B. NH_4Cl.
C. CO_2.
D. SO_2.
23. The red brown coating formed when iron nail is left in moist air for a long time is
A. hydrated iron (II) oxide.
B. hydrated iron (III) oxide.
C. anhydrous iron (II) oxide.
D. anhydrous iron (III) oxide.
24. Which one of the following gases turns a solution of potassium dichromate (VI) green?
A. Cl_2.
B. NO_2.
C. CO_2.
D. So_2.
25. Which one of the following hydroxides when exposed to air turns brown?
A. $Pb(OH)_2$.
B. $Fe(OH)_2$.
C. $Zn(OH)_2$.
D. $Mg(OH)_2$.

26. Which one of the following methods is normally used to prepare hydrogen in the laboratory?
A. Electrolysis of water.
B. Action of water on magnesium.
C. Action of dilute hydrochloric acid on iron.
D. Action of steam on zinc.

27. An oxide of an element X made up of 50% X. The simplest formula of the oxide is

A. XO.
B. X_2O.
C. XO_2.
D. X_2O_3.
(X=32; O=16)
28. A carbonate of an element Y has the formula $Y_2(CO_3)_3$. To which group in the Periodic Table does Y belong?
A. 1.
B. 2.
C. 3.
D. 4.
29. Which one of the following metals can burn in both oxygen and carbondioxide?
A. Al.
B. Ca.
C. Fe.
D. Mg.
30. Which one of the following equations does not represent reduction reaction?
A. $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$.
B. $Fe_{(s)} \rightarrow Fe^{3+}_{(aq)} + 3e$.
C. $Cl_{2(g)} + 2e \rightarrow 2Cl^-_{(aq)}$.
D. $Cu^{2+}_{(aq)} + 2e \rightarrow Cu_{(s)}$.
31. Which one of the following reagents is used for softening hard water?
A. Na_2CO_3.
B. Na_2SO_4.
C. $CaCO_3$.
D. $CaSO_4$.
32. When a stream of air is passed through sodium hydroxide solution and then over heated copper, the residual gas is mainly
A. Ne.
B. CO_2.
C. O_2.
D. N_2.

33. The reaction between dilute hydrochloric acid and magnesium ribbon is fast at the beginning and gradually slows down thereafter. This observed gradual decrease in the rate of reaction is due to the
A. gradual decrease in the number of hydrogen ions during the reaction.
B. insolubility of the magnesium chloride being produced.
C. increase in pressure above the reaction vessel brought about by the hydrogen gas being produced.
D. endothermic reaction between magnesium ions and chloride ions.
34. Methane burns in oxygen according to the equation:
$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$.
If $10cm^3$ of methane and $20cm^3$ of oxygen are mixed and exploded and the final products cooled to room temperature, the final gaseous volume is
A. 10 cm^3.
B. 15 cm^3.
C. 25 cm^3.
D. 30 cm^3.

*In each questions **35** to **45** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following:*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

35. Element Y burns with a yellow flame and reacts vigorously with water producing an alkaline solution and a gas which gives a pop sound with light splint. Which of the following is/are correct?
1. Y could be a group I element.
2. The gas given off I hydrogen.
3. Y burns in air forming a basic oxide.
4. Y will most likely form a covalent chloride.

36. When water is added to quicklime
1. heat is given off.
2. there is a hissing sound.
3. the quicklime crumbles to powder.
4. the quicklime dissolves.

37. Which one of the following substances are efflorescent?
1. $MgSO_4.7H_2O$.
2. $Na_2B_4O_7.10H_2O$.
3. $Na_2CO_3.10H_2O$.
4. $CaCl.1H_2O$.

38. Which one of the following are mixtures?
1. Diamond.
2. Brass.
3. Aluminium.
4. Steel.

39. When copper (II) sulphate solution is electrolyzed using platinum electrodes
1. copper is formed at the anode.

2. the colour of the solution remains unchanged.
3. oxygen is produced at the cathode.
4. the final solution is acidic.

40. Which one of the following conditions does **not** affect the rate of the reaction between lumps of calcium carbonate and dilute hydrochloric acid?
1. Grinding the calcium carbonate.
2. Adding iron powder to the mixture.
3. Warming the reaction mixture.
4. Exposing the reaction mixture to light.

41. When magnesium is burnt in air
1. there is an increase in mass.
2. bright light is observed.
3. magnesium nitride is formed.
4. there is decrease in mass.

42. Ionic compounds are generally
1. conductors of electricity when in molten state only.
2. soluble in water.
3. soluble in all solvents.
4. have high melting points.

43. Which one of the following compounds is/are used in the purification of water?
1. Calcium hypochlorite.
2. Calcium chloride.
3. Chlorine gas.
4. Carbondioxide gas.

44. Which of the following salts when in solution will form a white precipitate with dilute hydrochloric acid?
1. $Zn(NO_3)_2$.
2. $AgNO_3$.
3. $Ca(NO_3)_2$.
4. $Pb(NO_3)_2$.

45. Which of the following substances can be displaced by chlorine in a chemical reaction?
1. Flourine.
2. Iodine.
3. Hydrogen.
4. Bromine.

*Each of the questions **46** to **50** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True statement.

46.

	During the electrolysis of brine by using carbon electrodes, chlorine is liberated at the anode	**because**	chloride ion is higher in the electro chemical series than hydroxide ion.	
47.				
	Ammonium chloride and sodium chloride are separated by sublimation	**because**	sodium chloride has lower melting point than ammonium chloride.	
48.				
	When sulphurdioxide reacts with iron (III) sulphate, the solution turns from brown to green	**because**	sulphurdioxide is oxidised by iron (III) ions.	
49.				
	Water purified by filtration is made suitable for drinking by adding alum (potassium aluminium sulphate)	**because**	alum kills all the bacteria in the water.	
50.				
	Rubber is more elastic than polythene	**because**	rubber is a natural polymer.	

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Go to Index | E-mail Designer | FAQs

545/1
CHEMISTRY
PAPER 1
Nov./Dec. 1992
1½ **hours**

UGANDA NATIONAL EXAMINATION BOARD
Uganda Certificate of Education
CHEMISTRY
Paper 1
Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. The alloy solder consists of
A. zinc and lead.
B. copper and lead.
C. copper and aluminium.
D. tin and lead.

2. Which one of the following compounds is usually used as a catalyst in the reaction between pure zinc and dilute sulphuric acid in the laboratory?
A. MnO_2.
B. $FeSO_4$.
C. $CuSO_4$.
D. V_2O_5.

3. The percentage by mass of water of crystallisation in $CuSO_4.5H_2O$ is
A. $(\frac{90x100}{250})$
B. $(\frac{18x100}{250})$
C. $(\frac{90x100}{160})$

D. $(\frac{18x100}{160})$
(Cu=64; S=32= O=16= H=1)

4. Which one of the following metals will not displace lead from its salt in solution?
A. Aluminium.
B. Calcium.
C. Silver.
D. Zinc.

5. The gas produced when steam is passed over heated iron filling is
A. O_2.
B. N_2O.
C. H_2.
D. NO.

6. The electronic configurations of the atoms of elements X and Y are 2:8:3 and 2:6 respectively. The formula of the compound formed between X and Y is

A. XY.
B. X_2Y_3.
C. X_3Y_2.
D. X_2Y_5.

7. When an electric current was successively passed through a solution of silver nitrate and a solution of a metal M, 4.32 g of silver and 2.24 g of M were formed. The charge on the ion of M is
A. +1
B. +2
C. +3
D. +4

8. Which one of the following equations does **not** represent oxidation of the first substance?
A. $Fe_2O_{3(s)} + 3CO_{(g)} \rightarrow 2Fe_{(s)} + 3CO_{2(g)}$.
B. $2H_2S_{(aq)} + O_{2(g)} \rightarrow 2S_{(s)} + 2H_2O_{(l)}$.
C. $S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$.
D. $Zn_{(s)} + Cu^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$.

9. Which one of the following ions forms a green precipitate when reacted with sodium hydroxide solution?
A. $Cu^{2+}_{(aq)}$.
B. $Fe^{2+}_{(aq)}$.
C. $Al^{3+}_{(aq)}$.
D. $Fe^{3+}_{(aq)}$.

10. Which one of the following pairs of substances is used for the laboratory preparation of chlorine?
A. Dilute hydrochloric acid and potassium manganate (VII).
B. Concentrated sulphuric acid and sodium chloride.
C. Dilute hydrochloric acid and sodium sulphite.
D. Concentrated hydrochloric acid and potassium manganate (VII).

11. The molarity of a solution containing 40 g of sodium hydroxide in 500 cm^3 of the solution is
A. 0.2 M.
B. 0.5 M.
C. 1.0 M.
D. 2.0 M.
(Na=23; H=1; O=16)

12. Which one of the following gases does **not** react with water?
A. Ammonia.
B. Chlorine.
C. Carbon monoxide.

D. Sulphur dioxide.

13. The anion which can be confirmed by the brown ring test is
A. Cl^-.
B. SO_4^{2-}.
C. NO_3^-.
D. CO_3^{2-}.

14. Which one of the following chlorides can be prepared by precipitation?
A. $MgCl_2$.
B. $ZnCl_2$.
C. $CuCl_2$.
D. $PbCl_2$.

15. Graphite burns in oxygen according to the equation:
$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + \Delta H$.
When 48 g of graphite is burnt in excess oxygen the heat produced is
A. –97.5 kJ.
B. –195 kJ.
C. –780 kJ.
D. –1560 kJ.

16. The pair of compounds that can be used in the laboratory to prepare sulphur dioxide is
A. carbon and dilute sulphuric acid.
B. copper metal and dilute sulphuric acid.
C. iron (II) sulphide and dilute nitric acid.
D. sodium sulphite and dilute nitric acid.

17. Calcium carbonate reacts with hydrochloric acid according to the equation:
$CaCO_{3(2)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$.
Which one of the following pairs of substances will show the highest rate of production of carbon dioxide at room temperature?
A. 10 cm^3 of 2M hydrochloric acid + 2 g of lumps of calcium carbonate.
B. 10 cm^3 of 1M hydrochloric acid + 2 g of lumps of calcium carbonate.
C. 10 cm^3 of 2M hydrochloric acid + 2 g of powdered of calcium carbonate.
D. 10 cm^3 of 1M hydrochloric acid + 2 g of powdered of calcium carbonate.

18. Which one of the following reagents can be used to confirm the presence of lead (II) ions in solution?
A. Aqueous ammonia.
B. Aqueous potassium iodine.
C. Sodium hydroxide solution.
D. Barium nitrate solution.

19. The volume of a 0.25 M hydrochloric acid required to exactly react with 20.0 cm^3 of a 0.1 M sodium carbonate solution is given by
A. $\frac{20.0x0.1}{2x0.25}$
B. $\frac{20.0x0.25}{2x0.1}$
C. $\frac{2x20.0x0.25}{0.1}$
D. $\frac{2x20.0x0.1}{0.25}$

20. The electronic configurations of the atoms of elements P, Q, R and S are: P=2:1 ; Q=2:8:1 ; R=2:8:2 and S=2:8:3
The elements which belong to the same group in the Periodic Table are
A. P and Q.
B. P and R.
C. Q and R.

D. R and S.

21. Sodium carbonate and sodium hydrogen carbonate can be separated by fractional crystallisation because the two salts have different
A. densities.
B. carbonate. **OPTIONS ARE WRONGLY TYPED**
C. nitrate.
D. sulphite.

22. A few drops of concentrated sulphuric acid was added to a compound P. On warming the mixture, a colourless gas which fumes with ammonia was given off.
A. chloride.
B. carbonate.
C. nitrate.
D. sulphite.

23. Which one of the following elements is **not** a constituent of fertilizers?
A. Nitrogen.
B. Calcium.
C. Phosphorus.
D. Iodine.

24. When a dilute solution of sodium chloride is electrolysed using carbon electrodes, the substance formed at the anode is
A. chlorine.
B. sodium.
C. oxygen.
D. hydrogen.

25. Ammonium chloride reacts with calcium hydroxide according to the equation:
$2NH_4Cl_{(s)} + Ca(OH)_{2(s)} \rightarrow CaCl_{2(s)} + 2NH_{3(g)} + 2H_2O_{(l)}$.
Calculate the volume of ammonia at room temperature, produced when 2.14 g of ammonium chloride is reacted with calcium hydroxide

A. 0.48 dm^3.
B. 0.96 dm^3.
C. 1.92 dm^3.
D. 4.80 dm^3.
(Molecular mass of ammonium chloride=53.5; 1 mole of gas occupies 24 dm^3 at room temperature)

26. Which one of the following oxides does **not** react with dilute sodium hydroxide solution?
A. ZnO.
B. PbO.
C. Fe_2O_3.
D. Al_2O_3.

27. A compound with the structural formula $H_3C-\overset{CH3}{\underset{H}{C}}-CH_3$ is called

A. butane.
B. propane.
C. 2-methyl butane.
D. 2-methyl propane.

28. Which one of the following hydroxides is **not** an alkali?
A. $Cu(OH)_2$.
B. KOH.
C. $Ca(OH)_2$.
D. NaOH.

29. Rust is hydrated
A. iron (II) oxide.
B. iron (II) hydroxide.
C. iron (III) oxide.
D. iron (III) hydroxide.

30. Which one of the following compounds is used as a catalyst in the manufacture of sulphur trioxide from air and sulphur dioxide?
A. Alumina.
B. Vanadium (V) oxide.
C. Manganese (IV) oxide.
D. Iron powder.

31. Carbon monoxide burns in oxygen according to the equation:
$2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$.
20 cm^3 of carbon monoxide was mixed with 20cm^3 of oxygen and exploded. If all volumes were measured at the same temperature and pressure, what was the final gaseous volume?
A. 20 cm^3.
B. 30 cm^3.
C. 40 cm^3.
D. 50 cm^3.

32. An oxide of a metal M contains 78% of M and 22% oxygen, the empirical formula of the oxide is
A. MO.
B. MO_2.
C. M_2O_3.
D. M_3O.
(M=56; O=16)

33. Nitric acid can be prepared in the laboratory by the reaction between
A. potassium nitrate and concentrated hydrochloric acid.
B. potassium nitrate and concentrated sulphuric acid.
C. potassium nitrate and concentrated hydrochloric acid.
D. potassium nitrate and concentrated sulphuric acid.

*Each of the questions **34** to **39** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

34.

Carbohydrates are hydrocarbons	**because**	carbohydrates react with concentrated sulphuric acid to form carbon.	

35.

	Hydrogen chloride can be used in the foundation experiment	**because**	hydrogen chloride is soluble in water.	

36.

	Hard water requires a lot of soap to form a lather	**because**	some of the soap is initially used in removing calcium ions.	

37.

	Isotopes of an element show similar chemical reactions	**because**	isotopes of an element contain the same number of neutrons.	

38.

	When chlorine is bubbled into potassium iodine solution, iodine is liberated	**because**	iodine atom is larger than chlorine atom.	

39.

	The pH of an aqueous solution of carbondioxide is greater than 7	**because**	carbondioxide reacts with water to form carbonic acid.	

*In each questions **40** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

40. When iron filing is added to copper (II) sulphate solution
1. a brown solid is formed.
2. bubbles of gas are formed.
3. heat is produced.
4. the solution becomes colourless.

41. The carbon atoms in graphite
1. form a layer graphite.
2. are held together by double bonds.
3. are linked through single covalent bonds.
4. form a three dimensional network.

42. Which of the following solids would not show any change in mass when heated strongly in air?
1. Wax.
2. Copper.
3. Sodium hydroxide.
4. Potassium manganese (VII).

43. A solution of potassium hydroxide was added to a solution of copper (II) sulphate and the mixture heated strongly. The final product(s) formed was/were
1. CuO.

2. $Cu(OH)_2$.
3. K_2SO_4.
4. K_2O.

44. Which one of the following pairs of reactants would be suitable for preparing magnesium sulphate?
1. $Mg(NO_3)_{2(aq)}$ and $H_2SO_{4(aq)}$.
2. $MgCO_{3(aq)}$ and $H_2SO_{4(aq)}$.
3. $MgCl_{2(aq)}$ and $H_2SO_{4(aq)}$.
4. $Mg_{(s)}$ and $H_2SO_{4(aq)}$.

45. Covalent compounds
1. are usually solids at room temperature.
2. are formed by sharing of electrons.
3. conduct electricity when molten.
4. generally have low melting points.

46. Which of the following ions will form a white precipitate with barium chloride solution?
1. SO_4^{2-}.
2. Pb^{2+}.
3. CO_3^{2-}.
4. Zn^{2+}.

47. An element, T, belongs to group II in the Periodic Table, but below calcium. The element is likely to
1. be a solid at room temperature.
2. form an ionic chloride of formula TCl_2.
3. react with cold water and liberate hydrogen.
4. form an oxide which reacts with both acids and alkalis.

48. Which of the following is/are formed when sodium hydrogen carbonate is strongly heated?
1. Sodium metal.
2. Carbondioxide.
3. Sodium oxide.
4. Sodium carbonate.

49.

Air was passed through an apparatus as shown in the diagram in figure 1. The gas that comes out as Q consists of
1. neon.
2. oxygen.
3. nitrogen.
4. carbondioxide.

50. Which of the following sulphates when heated strongly, give(s) off a gas that turns potassium dichromate (VI) solution green?
1. $FeSO_4$.
2. $CuSO_4$.
3. $ZnSO_4$.
4. $CaSO_4$.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1993 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

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Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

---

1. Brass is an alloy of
A. tin and copper.
B. lead and copper.
C. zinc and copper.
D. aluminium and copper.

2. Which one of the following is normally used as a catalyst in the manufacture of sulphuric acid by the Contact process?
A. Vanadium (V) oxide.
B. Manganese (IV) oxide.
C. Platinum.
D. Iron.

3. A 0.2 molar solution of X contains 18.25 g of X per litre of the solution. The relative molecular mass of X is
A. 18.25
B. 36.50
C. 45.63
D. 91.25

4. Which one of the following mixtures is best separated by using a separating funnel?
A. Oil and water.
B. Sugar and water.
C. Ethanol and water.
D. Sand and water.

5. One of the products of the electrolysis of brine is
A. sodium nitrate.
B. sodium sulphate.
C. sodium carbonate.
D. sodium hydroxide.

6. $10cm^3$ of a dibasic acid was neutralised by $20cm^3$ of a 0.2 M sodium hydroxide. The molarity of the acid is

A. $\frac{2x10}{0.2x20}$
B. $\frac{0.2x20}{2x10}$
C. $\frac{10x0.2}{20x2}$
D. $\frac{2x0.2x20}{10}$

7. Which one of the following substances can be purified by sublimation?
A. Sulphur
B. Phosphorus.
C. Potassium chloride.
D. Ammonium chloride.

8. Lead (II) sulphate can be prepared by the action of dilute sulphuric acid on
A. lead metal.
B. lead (II) oxide.
C. lead (II) nitrate.
D. lead (II) carbonate.

9. Calcium carbonate decomposes according to the following equation:
$CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$.
The mass, in grams, of calcium oxide formed when 20 g of calcium carbonate completely decomposes is
A. $\frac{20x56}{100}$
B. $\frac{44x56}{100}$
C. $\frac{20x56}{2x100}$
D. $\frac{44x56}{2x100}$

10. The gas which decolourises both potassium manganese (VII) and bromine water is
A. ethene.
B. methane.
C. carbon monoxide.
D. hydrogen chloride.

11. Steam reacts with methane according to the equation:
$CH_{4(g)} + 2H_2O_{(g)} \rightarrow 4H_{2(g)} + CO_{2(g)}$.
What volume of gas will remain when 30 cm^3 of methane is reacted with 20 cm^3 of steam?
A. 20 cm^3.
B. 50 cm^3.
C. 70 cm^3.
D. 80 cm^3.

12. A concentrated solution of copper (II) chloride was electrolysed using carbon electrodes. Which one of the following substances was produced at the anode?
A. Copper.
B. Oxygen.
C. Hydrogen.
D. Chlorine.

13. The number of moles of hydrogen atoms present in one mole of ammonium sulphate, $(NH_4)_2SO_4$ is
A. 1
B. 2
C. 4
D. 8

14. Which one of the following cations when in solution reacts with aqueous potassium hydroxide to form a brown precipitate?
A. Fe^{3+}.
B. Al^{3+}.
C. Fe^{3+}.
D. Pb^{3+}.

15. Which one of the following processes decreases the concentration of carbondioxide in the atmosphere?
A. Rusting.
B. Combustion.

C. Respiration.
D. Photosynthesis.

16. On reduction, 3.2 g of an oxide of M gave 2.56 g of the element. The simplest formula of the oxide is
A. MO.
B. M_2O.
C. MO_2.
D. M_2O_3.
(M=64; O=16)

17. Which one of the following salts is not soluble in water?
A. Magnesium sulphate.
B. Magnesium carbonate.
C. Magnesium chloride.
D. Magnesium nitrate.

18. The formula of the ion formed when excess sodium hydroxide is added to aqueous aluminium chloride is
A. $[Al(OH)_4]^+$
B. $[Al(OH)_4]^-$
C. $[Al(OH)_4]^{3+}$
D. $[Al(OH)_4]^{3-}$

19. On complete combustion, on ole of butane, C_4H_{10}, produces 2877 kJ of heat energy. The mass, in grams, of butane which will produce 950 kJ of heat energy is
A. 0.3
B. 3.0
C. 19.2
D. 58.0
(C=12; H=1)

20. Which one of the following metals cannot be extracted from its ore by reduction with carbon?
A. Zinc.
B. Silver.
C. Lead.
D. Magnesium.
Elements P, Q, R and S have the following electronic configurations:
P=2:8 ; Q=2:8:1 ; R=2:8:2 and S=2:8:8

21. Which pair of elements belong to the same group in the Periodic Table?
A. P and Q.
B. P and S.
C. Q and R.
D. R and S.

22. Which of the following elements P, Q, R and S is an alkali earth metal?
A. P
B. Q
C. R
D. S
23. A jar of sulphur dioxide was inverted over a jar of hydrogen sulphide as shown in figure 1.

What was observed in the region labelled X?
A. Misty fumes.
B. A yellow solid.
C. A white solid.
D. A colourless liquid.

24. The number of protons in the nucleus of an atom of $^{11}_{5}B$ is

A. 5

B. 6
C. 11
D. 16

25. Which one of the following oxides will dissolve in dilute nitric acid but not in dilute sodium hydroxide solution?
A. Fe_2O_3.
B. Al_2O_3.
C. ZnO.
D. PbO.

26. Anhydrous zinc chloride can be best prepared by
A. reacting dilute hydrochloric acid with zinc metal.
B. reacting dilute hydrochloric acid with zinc metal.
C. passing dry hydrogen chloride over zinc metal.
D. passing dry hydrogen chloride over zinc oxide.

27. Which one of the following reactions will not produce hydrogen?

A. Electrolysis of aqueous sodium chloride.
B. Passing hydrogen chloride over heated copper turnings.
C. Addition of potassium to cold water.
D. Addition of aluminium to hot aqueous sodium hydroxide.

28. When compound Y was heated, carbondioxide was liberated and a residue which was yellow when cold remained. Y is
A. zinc carbonate.
B. iron (II) carbonate.
C. lead (II) carbonate.
D. sodium carbonate.
The graph labelled W in figure 2 shows the variation of the volume of oxygen liberated when 100 cm^3 of 2M hydrogen peroxide decomposes at 25 ^oC. Study the graph and answer questions 29 and 30.

29. To obtain curve V for the same reaction, all other conditions are kept constant expect
A. 100 cm^3 of 1M hydrogen peroxide is used.
B. the temperature is reduced to 12.5 ^oC.
C. manganese (IV) oxide is added to the peroxide.
D. 200 cm^3 of 2M hydrogen peroxide is used.

30. Curve X is obtained when all other conditions are kept the same except
A. 100 cm^3 of 1M hydrogen peroxide is used.
B. the temperature is raised to 50^oC.
C. manganese (IV) oxide is added to the peroxide.
D. 50 cm^3 of 2M hydrogen peroxide is used.

*Each of the questions **31** to **36** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

31.

Nitric acid can be prepared in the laboratory by reacting concentrated sulphuric acid with a nitrate	**because**	nitric acid is a monobasic acid.	

32.

Hydrogen chloride is not dried over calcium oxide	**because**	calcium oxide is a base.	

33.

Burning magnesium continues to burn over calcium oxide	**because**	burning magnesium decomposes carbondioxide into carbon and oxygen.	

34.

Calcium hydrogen carbonate causes permanent hardness of water	**because**	calcium hydrogen carbonate is an acid salt.	

35.

Graphite conducts electricity	**because**	graphite has a giant atomic structure.	

36.

Concentrated sulphuric acid is a strong dehydrating agent	**because**	sulphuric acid has a high affinity for water.	

*In each questions **37** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

37. The atomic numbers of elements X, Y and Z are 12, 8 and 7 respectively. Which of the following compounds is/are ionic?
1. XY.
2. Y_3Z_2.
3. X_3Z_2.
4. ZY_2.

38. Chlorine reacts with cold dilute potassium hydroxide to form
1. water.
2. potassium chloride.

3. potassium hypochlorite.
4. potassium chlorate.

39. Which of the following crystals will show a decrease in mass when exposed in the atmosphere?
1. Calcium chloride-6-water.
2. Copper (II) sulphate-5-water.
3. Iron (II) sulphate-7-water.
4. Sodium carbonate-10-water.

40. To the ashes obtained from the combustion of magnesium in air, water was added and the mixture warmed. The product(s) is/are
1. MgO.
2. NH_3.
3. Mg_3N_2.
4. $Mg(OH)_2$.

41. Carbon monoxide

1. burns in air.
2. is insoluble in water.
3. is a reducing agent.
4. forms a white precipitate with limewater.

42.

Which of the following gases can be collected by the method shown in figure 3?
1. NH_3.
2. O_2.
3. HCl.
4. H_2.

43. In which of the following reactions ix oxygen produced?

1. Heating copper (II) nitrate.
2. Heating potassium manganese (VII).
3. Electrolysis of dilute sulphuric acid using carbon electrodes.
4. Electrolysis of copper (II) nitrate solution using copper electrodes.

44. Concentrate nitric acid
1. liberates carbondioxide from carbonates.
2. is a dehydrating agent.
3. turns litmus red.
4. is a reducing agent.

45. The reagent(s) which can be used to test for the presence of sulphate ions in solution is/are
1. barium chloride solution.
2. potassium iodide solution.
3. lead (II) nitrate solution.
4. potassium carbonate solution.

46. Which of the following nitrates when heated give(s) off nitrogen dioxide/
1. Zinc nitrate.
2. Silver nitrate.
3. Calcium nitrate.
4. Potassium nitrate.

47. In the Haber process, the yield of ammonia could be increased by

1. raising the pressure of the gases.
2. increasing the temperature of the system.

3. pumping more air into the system.
4. using an impure iron catalyst.

48. The oxide(s) which will dissolve in water to give a solution with a pH greater than 7 is/are
1. SO_3.
2. CO_2.
3. NO_2.
4. CaO.

49. an alkali metal W is below potassium in the Periodic Table. W is likely to
1. be coloured.
2. be monoatomic.
3. form an ion of formula W^-.
4. form an ion of formula W^+.

50. Which of the following equation(s) show(s) a redox reaction?
1. $NH_{3(g)} + HCl_{(g)} \rightarrow NH_4Cl_{(s)}$.
2. $Mg_{(s)} + Cl_{2(g)} \rightarrow MgCl_{2(s)}$.
3. $2HNO_{3(aq)} + Mg_{(s)} \rightarrow Mg(NO_3)_{2(aq)} + H_{2(g)}$.
4. $3CuO_{(s)} + 2NH_{3(g)} \rightarrow 3Cu_{(s)} + N_{2(g)} + 3H_2O_{(l)}$.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1994 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
You are required to draw a horizontal line through the letter corresponding to the correct answer A, B, C or D against each question in the computer answer sheet provided. Only one letter represents the correct answer.
Mathematical tables, slide rules and silent, non-programmable calculators may be used.

1. The main components of air are
A. oxygen and nitrogen.
B. oxygen and hydrogen.
C. nitrogen and carbondioxide.
D. nitrogen and the noble gases.

2. Which one of the following substances undergoes a chemical reaction when heated?
A. Ice.
B. Argon.
C. Iodine.
D. Sulphur.

3. The percentage, by mass, of phosphorus in calcium phosphate $Ca_3(PO_4)_2$ is
A. 8 %.
B. 10 %.
C. 17 %.
D. 20 %.

Questions 4 and 5 concern the following salts:

A. Copper (II) carbonate.
B. Lead (II) nitrate.
C. Magnesium sulphate.
D. Potassium chloride
Select, from A to D, the salt which can be prepared by

4. The reaction of an acid with a metal.

5. precipitation.
6. Equal volumes of 0.1 M sodium hydroxide and 0.2 M hydrochloric acid were reacted. Which of the following statements is correct about the reaction?

A. A white precipitate is formed.
B. The pH of the final solution is 7.
C. There is a drop in temperature.
D. Sodium chloride and water are formed.
7. A solution that contains zinc ions will form
A. a reddish brown precipitate with magnesium.
B. a white precipitate soluble in excess sodium hydroxide solution.
C. a white precipitate with dilute sulphuric acid.
D. a green precipitate insoluble in excess aqueous ammonia.

8. Which one of the following substances is used to bleach sugar?
A. Chlorine.
B. Calcium chloride.
C. Sulphur dioxide.
D. Sodium sulphite.
9. Propene burns in oxygen according to the equation:
$2C_3H_{6(g)} + 9O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(l)}$.
When 2.1 g of propene is completely burned in oxygen, the volume of carbondioxide produced at room temperature is
A. 1.2 dm^3.
B. 2.4 dm^3.
C. 3.6 dm^3.
D. 4.8 dm^3.
(C=12; H=1; 1 mole of gas occupies 24 dm^3 at room temperature)
10. Which one of the following gases is least soluble in water?
A. Chlorine.
B. Ammonia.
C. Sulphur dioxide.
D. Hydrogen chloride.
11. When concentrated sulphuric acid is added to sugar, a black substance is produced. This is because sulphuric acid is
A. a strong reducing agent.
B. a strong oxidising agent.
C. a strong dehydrating agent.
D. a strong and corrosive acid.

12. Element M forms the ion M^{3+}. The atomic number of M is
A. 12
B. 13
C. 15
D. 19

13. Metal P displaces hydrogen from dilute acids but metal Q does no. Metal R displaces P from its chloride. The order of reactivity of the metals, beginning with the most reactive, is
A. P, Q, R.
B. Q, P, R.
C. R, Q, P.
D. R, P, Q.

14. Which one of the following acids can react with a base to produce an acid salt?
A. Nitric acid.
B. Ethanoic acid.
C. Sulphuric acid.
D. Hydrochloric acid.

15. Sulphur reacts with concentrated nitric acid to form
A. sulphuric acid.
B. sulphur dioxide.
C. sulphur trioxide.
D. hydrogen sulphide.

16. The formation of methanol from hydrogen and carbon monoxide is represented by the equation:
$1H_{2(g)} + CO_{(g)} \leftrightarrows CH_3OH_{(g)} \quad \Delta H=-92 \text{ kJ mol}^{-1}$.
A. 2.9
B. 3.6
C. 9.2
D. 10.2
(C=12; H=1; O=16)

17. A dilute solution of potassium bromide was electrolysed using carbon electrodes. The product at the positive electrode was
A. oxygen.
B. bromine.
C. hydrogen.
D. potassium.

18. When testing for a sulphate, dilute nitric acid is added before barium nitrate in order to
A. catalyse the reaction.
B. acidify the medium for reaction.
C. change the sulphate to a sulphite.
D. eliminate any sulphite or carbonate present.

19. When 6.4 g of an oxide of element X was heated and hydrogen passed over it, 3.2 g of X was formed. The empirical formula of the oxide is
A. XO.
B. XO_2.
C. X_2O.
D. X_2O_3.
(X=32, O=16)

20. Which one of the following chlorides is deliquescent?
A. Zinc chloride.
B. Calcium chloride.
C. Potassium chloride.
D. Magnesium chloride.

21. What mass, in grams, of sodium carbonate –10- water, $Na_2CO_3 .10H_2O$, is contained in $50cm^3$ of a 0.1 M solution?
A. $\frac{106x0.1x1000}{50}$
B. $\frac{106x0.1x50}{1000}$
C. $\frac{286x0.1x1000}{50}$
D. $\frac{286x0.1x50}{1000}$
(Na=23, C=12; O=16, H=1)

22. A gas has the following properties:
(i) Turns blue litmus red,
(ii) Forms white fumes with ammonia,
(iii) Forms a white precipitate with aqueous silver nitrate.
The gas is
A. hydrogen chloride.
B. hydrogen sulphide.
C. sulphur dioxide.
D. carbondioxide.

23. Ethene can react to form a solid whose molecular mass is more than 10,000. The reaction is called
A. cracking.
B. hydrogenation.
C. vulcanisation.
D. polymerisation.

24. When carbondioxide is bubbled through limewater, the limewater turns milky and finally clears because
A. the milky substance reacts to form a soluble compound.
B. limewater is a good solvent for the milky substance.
C. the reaction between carbondioxide and limewater is reversible.
D. carbondioxide eventually dissolves in limewater to form carbonic acid.

25. Fertiliser W was treated with calcium hydroxide and a gas which turned red litmus blue was evolved. W contained
A. sodium nitrate.
B. ammonium nitrate.
C. potassium sulphate.
D. potassium phosphate.

26. The electronic configurations of elements W, X, Y and Z are:
W=2:8:2; X=2:8:6; Y=2:8:7; Z=2:8:3.
Which of the following pairs are non-metals?
A. Y and Z.
B. X and Y.
C. W and Z.
D. W and X.

27. An elements burns readily in oxygen to form a solid. The solid dissolves in water producing an alkaline solution and a gas which relights a glowing splint.

A. sulphur.
B. sodium.
C. magnesium.
D. phosphorus.

28. To test for a chloride in solution,
A. nitric acid is added followed by silver nitrate solution.
B. sodium hydroxide is added dropwise until in excess.
C. aqueous ammonia is added dropwise until in excess.
D. iron (II) sulphate solution is added followed by concentrated sulphuric acid.

29. Which one of the following compounds does **not** cause hardness of water?
A. Calcium sulphate.
B. Sodium carbonate.
C. Magnesium sulphate.
D. Calcium hydrogen carbonate.

30. Which one of the following oxides can be reduced by dry ammonia?
A. Zinc oxide.
B. Calcium oxide.
C. Iron (III) oxide.
D. Copper (II) oxide.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

31.

Manganese (IV) oxide reacts with concentrated hydrochloric acid to produce chlorine	**because**	Manganese (IV) oxide is a basic oxide.	

32.

Carbon monoxide diffuses more rapidly than carbondioxide	**because**	the molecular mass of carbon monoxide is less than that of carbondioxide.	

33.

When sodium hydroxide solution on a watch glass is exposed to air, a white crust is formed	**because**	the solution evaporates leaving solid sodium hydroxide.	

34.

Sulphur dioxide turns moist dichromate paper green	**because**	it is an acidic gas.	

35.

When chlorine is bubbled through iron (III) chloride solution, the colour changes from yellow to green	**because**	chlorine is an oxidising agent.	

36.

2M nitric acid is as strong as acid as 2M ethanoic acid	**because**	The acids have the same molarity.	

*In each questions **37** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.

B. if 1, 3 only are correct

C. if 2, 4 only are correct.

D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

37. Which of the following compound(s) is/are usually used as drying agent(s)?

1. Magnesium oxide.
2. Calcium oxide.
3. Ammonia chloride.
4. Calcium chloride.

38. When a burning piece of magnesium is plunged into a jar of carbondioxide, the following observation(s) is/are made:

1. The magnesium continues to burn brightly.
2. Black particles are formed.
3. A white ash is formed.

4. The burning magnesium is extinguished.

39. Hydrogen

1. is lighter than air.
2. burns in air producing water.
3. reduces heated iron (III) oxide.
4. relights a glowing splint.

40. Which of the following metals is/are normally used for making cables?

1. Zinc.
2. Copper.
3. Magnesium.
4. Aluminium.

41. The atomic configurations of the atoms of elements P, Q, R, S, T and U are as follows:

P=2:8:2 Q=2:8:3 R=2:8:4 S=2:8:5 T=2:8:6 U=2:8:7

Which of the pair(s) of elements will form a covalent compound?

1. T and R.
2. P and U.
3. T and S.
4. Q and U.

42. When fuming nitric acid was heated, the gas evolved was collected over water. The gas was

1. nitrogen monoxide.
2. hydrogen.
3. nitrogen dioxide.
4. oxygen.

43. The slag formed in the blast furnace during the extraction of iron is used for

1. surfacing roads.
2. making steel.
3. manufacturing cement.
4. electroplating.

44. Aqueous sodium hydroxide was added was added to a solution of salt X and a white precipitate insoluble in excess alkali was formed.

X contained

1. lead ions.
2. zinc ions.
3. aluminium ions.
4. magnesium ions.

45. Which of the following compound(s) has/have a multiple bond?

1. CaH_{10}.
2. C_2H_2.
3. C_2H_6.
4. C_2H_4.

46. When copper (II) carbonate powder is heated strongly,

1. it gives off water of crystallisation.
2. a gas which turns limewater milky is produced.
3. it turns pale green and finally brown.
4. it forms a black residue.

47. Electrovalent compounds

1. dissolve in water to form alkaline solutions.
2. are formed by sharing of electrons.
3. have low melting points.
4. are strong electrolytes.

48. The rate of the reaction between zinc and hydrochloric acid is increased by

1. increasing the concentration of the acid.
2. using granulated zinc instead of zinc powder.

3. adding some copper (II) sulphate to the mixture.
4. immersing the reaction vessel in ice mixture.

49. Hydrogen bromide in solution

1. reacts with magnesium forming hydrogen and a salt.
2. reacts with a base to form a salt and water only.
3. liberates carbondioxide fro carbonates.
4. bleaches litmus paper.

50. Graphite

1. is an allotrope of carbon.
2. is an isotope of carbon.
3. conducts electricity in the solid state.
4. consists of atoms arranged in a tetrahedral shape.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1995 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. The valency of M in $M_2(SO_4)_3$ is
A. 2
B. 3
C. 4
D. 5

2. Which one of the following gases in the atmosphere makes rain water acidic?
A. Sulphur dioxide.
B. Carbon monoxide.
C. Ammonia.
D. Nitrogen.

3. The main component of biogas is
A. butane.
B. ethane.
C. ethene.
D. methane.

4. Which one of the following mixtures can be separated by sublimation?
A. A mixture of ammonium chloride and magnesium chloride.
B. A mixture of sodium chloride and sodium carbonate.
C. A mixture of calcium chloride and calcium carbonate.
D. A mixture of lead (II) chloride and iron filling.

5. Which one of the following processes is not an example of oxidation?
A. The burning of methane in air.
B. The rusting of iron.
C. The melting of a candle wax.
D. The smouldering of phosphorus.

6. Which one of the following reactions can be used to prepare hydrogen in the laboratory?
A. Reacting calcium with dilute sulphuric acid.
B. Reacting sodium with water.
C. Reacting zinc with dilute hydrochloric acid.
D. Reacting magnesium with steam.

Use the following information to answer questions 7 and 8.
The melting points and boiling of substances R, S, T and U are shown below.

Substance	Melting Point (^oC)	Boiling Point (^oC)
R	17	118
S	-21	140
T	651	1100

U	-114	-8.5

7. Which one of the substances is a gas at room temperature (25^oC)?
- **A.** R
- **B.** S
- **C.** T
- **D.** U

8. Which one of the substances is a metal?
- **A.** R
- **B.** S
- **C.** T
- **D.** U

9. 2.0 g of sodium hydroxide was dissolved in water to make 5000 cm^3 of solution. The molarity of the solution is
- **A.** 2M
- **B.** 0.5M
- **C.** 0.1M
- **D.** 0.05M

10. Which one of the following reactions shows the oxidising property of nitric acid?
- **A.** $PbO_{(s)} + 2HNO_{3(aq)} \rightarrow Pb(NO_3)_{2(aq)} + H_2O_{(l)}$.
- **B.** $CaCO_{3(s)} + 2HNO_{3(aq)} \rightarrow Ca(NO_3)_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$.
- **C.** $Cu_{(s)} + 4HNO_{3(aq)} \rightarrow Cu(NO_3)_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$.
- **D.** $NaOH_{(aq)} + HNO_{3(aq)} \rightarrow NaNO_3 + H_2O_{(l)}$.

11. Which one of the methods below is used to prepare a sample of copper (II) chloride?
- **A.** Heating copper in stream of dry chlorine.
- **B.** Action of copper on dilute hydrochloric acid.
- **C.** Reacting copper (II) oxide with hydrochloric acid.
- **D.** Heating copper in a stream of dry hydrogen chloride.

12. Sulphur dioxide behaves as an oxidising agent when it reacts with
- **A.** concentrated nitric acid.
- **B.** iron (III) sulphate.
- **C.** hydrogen sulphate.
- **D.** potassium dichromate.

13. What is the percentage of sulphur in iron (III) sulphate. $Fe_2(SO_4)_3$?
(O=16; S=32; Fe=56)
- **A.** $\frac{32x100}{400}$
- **B.** $\frac{96x100}{400}$
- **C.** $\frac{112x100}{400}$
- **D.** $\frac{128x100}{400}$

14. Which one of the following crystalline substances will turn into white powder when exposed to air?
- **A.** Copper (II) sulphate.
- **B.** Magnesium sulphate.
- **C.** Sodium carbonate.
- **D.** Calcium chloride.

15. Barium sulphate is insoluble in water. How can it be prepared in the laboratory?
- **A.** By dissolving barium oxide in concentrated sulphuric acid.
- **B.** By adding barium nitrate solution to dilute sulphuric acid.
- **C.** By dissolving barium metal in dilute sulphuric acid.

D. By adding barium carbonate to concentrated sulphuric acid.

Use the following information to answer questions 16 and 17.
The electronic configurations of elements W, X, Y and Z are shown below:

W	2:8:3
X	2:8:5
Y	2:8:6
Z	2:8:2

16. Which of the following elements from positive ions?
A. X and Y.
B. Y and Z.
C. W and Z.
D. W and X.

17. Which one of the following pairs of elements will react to form a covalent compound?
A. X and Z.
B. X and Y.
C. W and Y.
D. Y and Z.

18. When 40 g of an oxide of an element X were reduced, 3.2 g of X were obtained. The simplest formula of the oxide of X is (X=64)
A. X_2O.
B. XO.
C. XO_2.
D. X_2O_3.

19. When silver nitrate was added to a solution followed by dilute nitric acid, a white precipitate was formed. The solution contained
A. sulphate ions.
B. carbonate ions.
C. chloride ions.
D. sulphite ions.

20. When aqueous ammonia was added to solution X, a white precipitate was formed which dissolved in excess ammonia solution. X contained
A. Pb^{2+}.
B. Zn^{2+}.
C. Mg^{2+}.
D. Cu^{2+}.

21. Lead (II) nitrate reacts with potassium iodide according to the equation:
$Pb(NO_3)_{2(aq)} + 2Kl_{(aq)} \rightarrow Pbl_{2(s)} + 2KNO_{3(aq)}$.
The mass of lead (II) iodide that will be formed when 33.2 g of potassium iodine reacts with excess lead (II) nitrate is (K=39; l=127; Pb=207)

A. 16.6 g.
B. 46.1 g.
C. 66.4 g.
D. 92.2 g.

22. Magnesium reacts with chlorine, when heated, according to the equation:
$Mg_{(s)} + Cl_{2(g)} \rightarrow MgCl_{2(s)}$.
The volume of chlorine, in litres, at s.t.p. that will react completely with 0.6 g of magnesium is
(1 mole of gas at s.t.p. occupies 22.4 l; Mg=24)

A. $\frac{0.6}{24}$ x 22.4

B. $\frac{0.6}{24}$ x $\frac{22.4}{2}$

C. $\frac{0.6}{24}$ x 24

D. $\frac{0.6}{24}$ x $\frac{24}{2}$

23. Which one of the following is the correct statement about electroplating a substance with copper?
A. The anode is made of the substance to be copper plated.
B. The cathode is made of copper.
C. The anode is made of copper.
D. The electrolyte is dilute sulphuric acid.

24. How is permanent hardness of water removed?
A. By boiling the water.
B. By adding slaked lime.
C. By adding washing soda.
D. By adding ammonia solution.

25. Which one of the following equations represents a neutralising reaction?
A. $Fe_{(s)} + 2HCl_{(g)} \rightarrow FeCl_{2(s)} + H_{2(g)}$.
B. $NH_{3(g)} + H_2O_{(l)} \rightarrow NH_4OH_{(aq)}$.
C. $NaOH_{(aq)} + KNO_{3(aq)} \rightarrow NaNO_{3(aq)} + H_2O_{(l)}$.
D. $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$.

26. The following are some properties of metals P, Q and R.
(i) P reacts only with steam to produce hydrogen.
(ii) Q reacts with cold water to produce hydrogen.
(iii) R displaces Q from solutions of its ions.
The order of reactivity of the metals, beginning with the most reactive, is
A. P, Q, R.
B. Q, R, P.
C. P, R, Q.
D. R, Q, P.

27. When 2.0 g of substance X were burnt the heat produced raised the temperature of 1000 g of water by 15.6 ^oC. The molar heat of combustion of X in joules is (The specific heat capacity of water is 4/2 J g^oC^{-1}; relative molecular mass of X is 60).

A. $\frac{1000x4.2x15.6x2.0}{60}$

B. $\frac{15.6x60x1000}{2.0x4.2}$

C. $\frac{15.6x2.0x1000}{4.2x60}$

D. $\frac{4.2x15.6x60}{2.0x1000}$

28. One advantage of hard water is that
A. it does not contain bacteria.
B. it forms lather more readily with soap.
C. it contains calcium compounds which help to form healthy bones.
D. it forms scales in boilers which prevent the boilers from leaking.

29. Which one of the following does **not** produce a white precipitate with lead (II) nitrate?
A. Dilute sulphuric acid.
B. Dilute hydrochloric acid.
C. Excess ammonia solution.
D. Excess sodium hydroxide solution.

30. Carbon monoxide can be obtained from carbondioxide by
A. heating carbondioxide over heated carbon.
B. passing carbondioxide over heated carbon.
C. heating a mixture of carbondioxide and steam.
D. passing carbondioxide over heated copper.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

31.

Chlorine is used in the purification of water	**because**	chlorine is a bleaching agent.

32.

Hydrochloric acid reacts faster with zinc granules than zinc powder	**because**	zinc granules have a smaller surface area than zinc powder.

33.

In the contact process, sulphur trioxide is dissolved in concentrated sulphuric acid and not in water	**because**	sulphur trioxide is insoluble in water.

34.

Crude petroleum is refined by fractional crystallisation	**because**	its fractions have different boiling points.

35.

When a solution of copper (II) sulphate is electrolysed used copper electrode, the mass of anode decreases	**because**	the anode itself becomes oxidised during the process of electrolysis.

36.

Pure sulphuric acid does **not** conduct electricity	**because**	it has a great affinity for water.

37.

Sodium carbonate dissolves in water to form a solution whose pH is less than 7	**because**	sodium carbonate is a salt formed by the reaction of a strong base and a weak acid.

38.

Zinc is used to galvanize iron	**because**	zinc is passive in air.

*In each questions **39** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.
B. if 1, 3 only are correct
C. if 2, 4 only are correct.
D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

39. Which one of the following elements burns(s) in oxygen to form a basic oxide?
1. Aluminium.
2. Sulphur.
3. Calcium.
4. Carbon.

40.
Which of the following gases can be collected by the method shown in the diagram above?
1. H_2.
2. O_2.
3. HCl.
4. NH_3.

41. When a mixture of ethanol and concentrated sulphuric acid is heated, a gas is liberated. Which of the following properties is/are shown by the gas?
1. It is soluble in water.
2. It decolourises bromine water.
3. It decolourises potassium manganese (VII).
4. It forms a white precipitate with limewater.

42. An alkali metal M is below potassium in the Periodic Table. Which of the following properties is/are shown by M?
1. M reacts violently with cold water.
2. M forms coloured salts.
3. M forms a bromide of formula MBr.
4. M is a gas at room temperature.

43. Which of the following is/are true about an aqueous solution of hydrogen chloride?
1. It turns red litmus paper to blue.
2. It reacts with hydrogen carbonates to form carbondioxide.
3. It bleaches litmus paper.
4. It reacts with zinc oxide to form zinc chloride.

44. When a compound P was strongly heated, a gas which turns limewater milky was liberated. P is likely to be
1. sodium hydrogen carbonate.
2. sodium carbonate decahydrate.
3. potassium hydrogen carbonate.
4. potassium carbonate.

45. Which of the following occur(s) when sodium nitrate is strongly heated?
1. It melts.
2. It gains weight.

3. It liberates oxygen.
4. It liberates nitrogen dioxide.

46. Concentrated sulphuric acid was added to crystals of sugar in a beaker. Which of the following observations was/were made?
1. Heat energy was evolved.
2. The crystals crumbled into a powder.
3. A black substance was formed.
4. A hissing sound was heard.

47. Which of the statements below is/are true about atoms?
1. They combine in small whole numbers.
2. They are made up neutrons, protons and electrons.
3. They have nuclei which take up the largest volume of the atoms.
4. They are all exactly alike for a given element.

48. Which of the following is/are observed when sodium is heated and lowered into a jar of chlorine?
1. White clouds.
2. Sodium melts.
3. Sodium burns with a yellow flame.
4. a shower of sparks is emitted.

49. In which of the following reactions is a catalyst required?
1. $S_{(s)} + O_{2(g)} \rightarrow SO_{(g)}$.
2. $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$.
3. $2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$.
4. $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$.

50. The discharged of an ion at an electrode depends on
1. the position of the ion in the activity series.
2. the concentration of the ion.
3. the nature of the electrode.
4. the magnitude of the charge on the ion.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1996 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. The atomic number of element Z is 17. In which Group of the Periodic Table is Z?
A. I
B. II
C. V
D. VII

2. Which one of the following is a monomer of protein?
A. Glucose.
B. Amino.
C. Isoprene.
D. Ethene.

3. Which one of the following cations when in solutions reacts with aqueous hydroxide to form a precipitate?
A. Pb^{2+}.
B. Fe^{2+}.
C. Fe^{3+}.
D. Al^{3+}.

4. The atomic numbers of elements, P, Q and R are 12, 8 and 7 respectively. Which of the following compounds are ionic?
A. PQ and Q_3R_2.
B. PQ and P_3R_2.
C. Q_3R_2 and RQ.
D. P_3R_2 and RQ_2.

5. An anhydrous salt R has a relative formula mass of 158 and forms a hydrated salt with the formula R_nH_2O. 79 g of R combined with 45 g of water. The value of n is
(H=1, O=16)
A. 2
B. 3
C. 5
D. 10

6. Sulphuric acid reacts with sodium hydroxide according to equation:

$H_2SO_{4(aq)} + 2NaOH_{(aq)} \rightarrow NaSO_{4(aq)} + 2H_2O_{(l)}$.

What volume of sulphuric acid is required to react completely with $10cm^3$ of 2M of sodium hydroxide solution?

A. 5 cm^3.
B. 10 cm^3.
C. 20 cm^3.
D. 30 cm^3.

7. Which one of the following gases turns potassium dichromate solution green?
A. NH_3.
B. NO_2.
C. Cl_2.
D. SO_2.

8. Methane burns in air according to the equation:
$CH_{4(g)} + 20_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)} + Heat$ $(H=890\ kJ^{-1})$
The energy liberated when 4 g of methane is burnt in air:
(C=12, H=1)
A. 222,5 kJ.
B. 445.0 kJ.
C. 1780.0 kJ.
D. 3560.0 kJ.

9. The apparent increase in the mass of copper observed when 0.25 mole of the metal is heated very strongly in air is
A. 4 g.
B. 8 g.
C. 16 g.
D. 20 g.

10. Which one of the following dissolves in water to give a sodium with a pH less than seven?
A. $(NH_4)_2SO_4$.
B. KCl.
C. Na_2CO_3.
D. CH_2CO_2Na.

11. Barium nitrate solution was added, followed by excess dilute nitric acid to three test-tubes containing solutions of unknown anions. The results obtained are shown below.
Results:
Test tube 1: There was no visible change.
Test tube 2: White precipitate seen which dissolved in excess acid.
Test tube 3: White precipitate seen insoluble in excess acid.
Which test(s) contained an anion?
A. 1 only.
B. 2 only.
C. 3 only.
D. 2 and 3.

12. Ammonia is obtained from hydrogen and nitrogen according to the equation:
$N_{2(g)} + 3H_{2(g)} \rightarrow NH_{3(g)}$.
The volume of ammonia produced when 25 l of nitrogen reacts with excess hydrogen at constant temperature and pressure is

A. 12.5 l
B. 25.0 l
C. 50.0 l
D. 75.0 l

13. Which one of the following gases is an oxidising agent?
A. CO.
B. H_2S.
C. Cl_2.
D. NH_3.

14. A colourless gas P, was passed over red-hot lead (II) oxide as shown in the diagram below.

When the gas that came off was bubbled through calcium hydroxide solution, a white precipitate was formed P is
A. hydrogen.

B. carbon dioxide.
C. butane.
D. carbon monoxide.

15. When lead nitrate solution reacts with potassium iodide solution it forms a
A. brown solution.
B. red solution.
C. yellow precipitate.
D. white precipitate.

16. A bottle of copper(II) oxide has been contaminated with some solid sodium chloride. How can the sodium chloride be removed from the copper(III) oxide?
A. Place the mixture in a separating funnel.
B. Add dilute acid to the mixture and filter.
C. Add aqueous silver nitrate to the mixture.
D. And water to the mixture and filter.

17. What mass of sodium hydroxide is in 0.5 litre of 2M sodium hydroxide solution:
A. 10 g.
B. 20 g.
C. 40 g.
D. 80 g.

18. Hydrogen reacts with chlorine according to the following reaction
$H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$
what volume of hydrogen chloride would be formed when $30cm^3$ of hydrogen is reacted with $50cm^3$ of chlorine at constant temperature and pressure is
A. 20 cm^3.
B. 40 cm^3.
C. 60 cm^3.
D. 80 cm^3.

19. Hydrogen and nitrogen react according to the following equation:
$N_{2(g)} + 3H_{2(g)} \rightleftarrows 2NH_{3(g)}$.
The volume of nitrogen at s.t.p. which will react completely with 6.72 litres of hydrogen is

(1 mole of a gas occupies 22.4 litres at s.t.p)
A. 2.24 litres.
B. 6.72 litres.
C. 22.4 litres.
D. 67.2 litres.

20. The percentage mass of water of crystallisation in $CuSO_4.5H_2O$ is:
(Cu=64; S=32, O=16, H=1)

A. $(\frac{90x100}{250})$ %
B. $(\frac{20x100}{160})$ %
C. $(\frac{18x100}{250})$ %
D. $(\frac{20x100}{160})$ %

21. The graph X below shows the variation in mass with time when 50 g of calcium carbonate powder was reacted with excess 1M HCl at 25^oC

To obtain graph Y for the same reaction, one would keep all other conditions of the reaction the same but
A. use 2M hydrochloric acid.
B. use 50 g of calcium carbonate lumps.
C. reduce the temperature to $12,5^oC$.

D. use 25 g of calcium carbonate powder.

22. The gas that **cannot** be dried using concentrated sulphuric acid is
A. sulphur dioxide.
B. hydrogen sulphide.
C. hydrogen chloride.
D. carbon monoxide.

23. Carbondioxide is normally, prepared by
A. nitric acid on calcium carbonate.
B. nitric acid on sodium hydrogen carbonate.
C. sulphuric acid on calcium carbonate.
D. sulphuric acid on sodium carbonate.

24. The valency of X in $X_2(SO_4)_3$ is
A. 2
B. 3
C. 4
D. 5

25. Which one of the following substances is used as a catalyst in the reaction between zinc and dilute sulphuric acid?
A. Copper (II) sulphate.
B. Manganese (IV) oxide.
C. Vanadium (V) oxide.
D. Iron powder.

26. Chlorine can be prepared in the laboratory by reacting
A. sodium chloride and concentrated ethanol acid.
B. potassium chlorate and concentrated sulphuric acid.
C. sodium chloride and concentrated sulphuric acid.
D. potassium permanganate and concentrated hydrochloric acid.

27. Which one of the following substances are formed when ammonia is oxidised by air in the presence of a catalyst?

A. Nitrogen and water.
B. Nitrogen and nitrogen dioxide.
C. Nitrogen monoxide and water.
D. Nitrogen and hydrogen.

28. Which one of the elements below combines directly with nitrogen?
A. Sodium.
B. Copper.
C. Iron.
D. Zinc.

29. 6.5 g of an element X combine with oxygen to give 8.1 g of oxide. The simplest formula of the oxide is (O=16; X=65)
A. X_2O.
B. XO.
C. XO_2.
D. X_2O_3.

30. Which one of the following oxides is soluble in water?
A. Lithium oxide.
B. Iron (III) oxide.
C. Aluminium oxide.
D. Copper (II) oxide.

31. Which one of the following substances is produced at the cathode when a dilute solution of potassium chloride is electrolysed using carbon electrodes?

A. Potassium.
B. Chlorine.
C. Hydrogen.
D. Oxygen.

32. Which of the following metals can be extracted by reduction of the oxide with carbon?
A. Potassium.
B. Aluminium.
C. Zinc.
D. Magnesium.

33. A reaction does **not** take place when of these mixtures is heated. Which is it?
A. Zinc and aluminium oxide.
B. Zinc and copper oxide.
C. Magnesium and Zinc oxide.
D. Zinc and lead (II) oxide.

34. Which one of the following substances does **not** sublime when heated?
A. Ammonium chloride.
B. Iron (III) chloride.
C. Iodine.
D. Copper (II) oxide.

35. Which one of the following reactions does **not** take place in the extraction of iron in the Blast furnace?

A. Carbon monoxide, reduces iron (II) oxide to iron.
B. Limestone decomposes to form calcium oxide.
C. Coke burns in air forming carbondioxide.
D. Limestone reduces iron (II) oxide to iron.

36. Solder is an alloy made of
A. zinc and aluminium.
B. lead and tin.
C. copper and lead.
D. aluminium and copper.

37. Which one of the following methods can be used to extract magnesium from its ore?

A. Decomposition by heat.
B. Electrolysis.
C. Reduction with carbon monoxide.
D. Crystallisation.

38. a concentrated solution Y, was electrolysed using graphite electrodes. A gas which turned potassium iodine solution brown, was evolved at one of the electrodes. Solution Y contained
A. hydrogen ions.
B. chlorine ions.
C. ammonium ions.
D. sulphate ions.

39. Which one of the following equations does **not** represent a redox reaction?
A. $Pb^{2+}_{(aq)} + 2Cl^{-}_{(aq)} \rightarrow PbCl_{2(s)}$.
B. $2Fe^{2+}_{(aq)} + Cl_{2(g)} \rightarrow 2Fe^{3+}_{(aq)} + 2Cl^{-}_{(aq)}$.
C. $Mg_{(s)} + 2H^{+}_{(aq)} \rightarrow Mg^{2+}_{(aq)} + H_{2(g)}$.
D. $CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_{2(l)}$.

40. Which one of the following oxides is **not** amphoteric?
A. ZnO.
B. Al_2O_3.
C. Fe_2O_3.

D. PbO.

41. An tom of an element has the structure $^{20}_{10}X$. The element

A. forms covalent bonds readily with non-metals.
B. forms ionic bonds with non-metals.
C. belongs to group II of the Periodic Table.
D. has full shells of electrons.

*Each of the questions **42** to **50** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

42.

Sulphuric acid displaces nitric acid from nitrates	**because**	nitric acid is a stronger oxidising agent than sulphuric acid.

43.

Zinc hydroxide is soluble in excess aqueous ammonia	**because**	zinc hydroxide is a divalent metal (amphoteric).

44.

Ethene readily decolourises bromine water	**because**	it is saturated.

45.

Barium nitrate solution is used to test for the presence of chlorine ions in solution	**because**	barium chloride is soluble in water.

46.

When hydrogen sulphide reacts with moist sulphur dioxide, sulphur is deposited	**because**	sulphur dioxide is a stronger reducing agent than hydrogen sulphite.

47.

Chlorine water bleaches wet dyes	**because**	hypochlorous acid supplies oxygen to dyes.

48.

Concentrated sulphuric acid reacts with oxalic acid to produce carbondioxide, carbon monoxide and water	**because**	concentrated sulphuric acid hydrates oxalic acid.

49.

50.

Water and alcohol can be separated by fractional distillation	**because**	they have different boiling points.	
Ammonia gas turns moist red litmus paper blue	**because**	it is an acidic gas.	

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1997 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. Which one of the following statements is true when a solid is changing into a liquid?
A. The temperature increases as energy is increased.
B. The temperature remains constant as energy is increased.
C. The temperature drops as energy is increased.
D. The temperature remains constant as the energy decreases.

2. Which one of the following pairs of gases are removed first before air is liquefied?
A. Nitrogen and oxygen.
B. Water vapour and carbondioxide.
C. Carbondioxide and oxygen.
D. Water vapour and nitrogen.

3. Zinc reacts with hydrochloric acid according to the following equation:
$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$.
The volume of hydrogen gas liberated at s.t.p. when 13 g of zinc with excess hydrochloric acid is (Zn=65, 1 mole of gas occupies 22.4 dm^3 at s.t.p.)
A. 2.24 dm^3.
B. 4.48 dm^3.
C. 22.4 dm^3.
D. 11.2 dm^3.

4. The gas formed when chlorine water is exposed to sunlight is
A. oxygen.
B. hydrogen.
C. chlorine.
D. hydrogen chloride.

5. The products of the reaction between concentrated sulphuric acid and copper are
A. water and copper (II) sulphate.
B. water, sulphurdioxide, and copper (II) sulphate.
C. water, copper (II) sulphate and hydrogen.
D. sulphurdioxide and copper (II) sulphate.

6. The solubility of salt W is 35 g per 100 cm^3 of water at 20^oC. The mass of W in 40 cm^3 of water at the same temperature is

A. 7.0 g.
B. 14.0 g.
C. 87.5 g.
D. 114.3 g.

7. 80 cm^3 of hydrogen and 80 cm^3 of oxygen are allowed to react. What volume of gas remains unreacted?
A. 40 cm^3.

B. 80 cm^3.
C. 120 cm^3.
D. 160 cm^3.

8. In the preparation of hydrogen from zinc and dilute hydrochloric acid, the rate of reaction is increased by adding
A. nickel.
B. copper sulphate.
C. platinum.
D. manganese dioxide.

9. The atomic number of aluminium ion (Al^{3+}) is 13. The electronic configuration of the aluminium (Al^{3+}) is
A. 2:8
B. 2:8:3
C. 2:8:6
D. 2:8:8

10. 0.02 moles of calcium chloride ($CaCl_2$) is dissolved to make 200 cm^3 of solution. What is the concentration of chloride ions in moles per litre, in this solution?
A. 0.05 M.
B. 0.1 M.
C. 0.2 M.
D. 0.3 M.

11. During electrolysis, 0.015 and 0.005 moles of element Y and hydrogen are produced respectively, what is the valency of Y likely to be?
A. 1
B. 2
C. 3
D. 4

12. The number of neutrons in the atom of an element Y represented by $^{213}_{84}Y$ is
A. 84
B. 129
C. 213
D. 297

13. Which one of the following is the least effective substance for putting off a petrol fire?
A. Water.
B. Carbondioxide.
C. Powders.
D. Volatile liquids.

14. The empirical formula of a compound A is C_3H_4. 25 g of A occupies 14 dm^3 at s.t.p. The molecular formula of A is (C=12; H=1; 1 mole of gas occupies 22.4 dm^3 at s.t.p)
A. C_3H_4.
B. C_3H_8.
C. C_6H_6.
D. C_6H_8.

15. Which one of the following observations would be made if a clean magnesium ribbon is added to copper (II) sulphate solutions?
A. The ribbon would dissolve and the blue solution would fade.
B. The ribbon would dissolve and the blue solution maintained, and a brown solid formed.
C. The ribbon would dissolve and a colourless solution formed.
D. The ribbon would dissolve and no colour would occur.

16. Which one of the substances has a giant ionic structure?
A. Sodium chloride.
B. Hydrogen chloride.

C. Graphite.
D. Diamond.

17. Carbon reacts with sulphur to the following equation:
$C_{(s)} + 2S_{(s)}$ ➔ $CS_{2(l)}$ H=116 kJ mol^{-1}.
The amount of heat absorbed when 16 g of sulphur reacts with excess carbon is (C=12, S=32)
A. 7 kJ.
B. 29 kJ.
C. 58 kJ.
D. 116 kJ.

18. The volume of 0.2 M solution which neutralises 25 cm^3 of 0.1 M hydrochloric acid is
A. 5 cm^3.
B. 12.5 cm^3.
C. 25 cm^3.
D. 50 cm^3.

19. Which one of the following types of water would take the greatest amount of soap solution to form lather using same volume of each type?
A. Rain water.
B. Distilled water.
C. Sea water.
D. River water.

20. Nitrogen monoxide reacts with oxygen according to the following equation:
$2NO_{(g)} + O_2$ ➔ $2NO_{2(g)}$.
What volume of oxygen would react with 200cm^3 of nitrogen monoxide?
A. 100 cm^3.
B. 200 cm^3.
C. 300 cm^3.
D. 400 cm^3.

21. Which one of the following is a synthetic polymer?
A. Wool.
B. Cotton.
C. Silk.
D. Nylon.

22. Which one of the following equations is of a redox reaction?
A. $2NaOH_{(aq)} + CuCl_{2(aq)}$ ➔ $Cu(OH)_{2(s)} + 2NaCl_{(aq)}$
B. $2FeCl_{2(aq)} + Cl_{2(g)}$ ➔ $2FeCl_{3(aq)}$
C. $2NaOH_{(aq)} + H_2SO_{4(aq)}$ ➔ $Na_2SO_{4(aq)} + H_2O_{(l)}$
D. $ZnCO_{3(s)} + 2HNO_{3(aq)}$➔ $Zn(NO_3)_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$

23. Which one of the following mixtures would not form a precipitate?
A. Barium nitrate and sodium sulphate.
B. Lead nitrate and potassium iodine.
C. Copper nitrate and sodium sulphate.
D. Silver nitrate and potassium bromine.

24. Sulphur dioxide reacts with oxygen to form sulphur trioxide according to the equation:
$SO_{2(g)} + O_{2(g)}$ ⇐➔ $2SO_{3(g)}$ + heat.
Which one of the following conditions favours the formation of sulphur trioxide?

A. Low pressure and low temperature.
B. High pressure and high temperature.
C. Low pressure and high temperature.
D. High pressure and low temperature.

25. What is not true about the atoms $^{12}_{6}X$ and $^{14}_{6}Y$?

A. They have the same number of protons.
B. They have the same number of electrons.
C. They are atoms of the same element.
D. They have the same number of protons.

26. Which one of the following hydroxides will dissolve in excess ammonia?
A. $Pb(OH)_2$.
B. $Cu(OH)_2$.
C. $Fe(OH)_2$.
D. $Al(OH)_3$.

27. Which one of the following colours is observed when sodium is burnt in air?

A. Blue.
B. Yellow.
C. Green.
D. Purple.

28. The results of the chromatography of the dyes used in making three sweets X, Y and Z is shown in figure 1 below.

The number of dyes used in making the sweets is
A. 3
B. 4
C. 5
D. 9

29. Which one of the following nitrogen compounds contain at least amount of nitrogen? (H=1; C=12; N=14; O=16)
A. NH_2OH.
B. NH_3.
C. NH_2NH_2.
D. NH_3NH_2.

30. Which one of the following contains the same number of atoms as 8 g of sulphur?
(C=12; S=32; Ca=40)
A. 20 g calcium.
B. 10 g calcium.
C. 12 g carbon.
D. 4 g carbon.

*In each questions **31** to **40** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.
B. if 1, 3 only are correct
C. if 2, 4 only are correct.
D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

31. Which of the following substances can be displaced by chlorine in a chemical reaction?
1. Fluorine.
2. Iodine.
3. Hydrogen.
4. Bromine.

32. How does a soap differ from a detergent?
1. A detergent is made from vegetable oil but soap from an animal oil.
2. A detergent is not efficient with hard water.
3. A detergent is in powder form only.
4. Soap is not efficient with hard water.

33. When sodium hydroxide solution is added to a solution of nitric acid in a beaker, which of the following takes place? The
1. pH of mixture in beaker increases.
2. pH of mixture in beaker decreases.
3. hydroxide ions neutralise some hydrogen ions.
4. hydrogen ion concentration increases.

34. Iron is prevented from rusting by
1. greasing.
2. electroplating.
3. galvanising.
4. chlorinating.

35. Which one of the following are mixtures?

1. Diamond.
2. Brass.
3. Aluminium.
4. Steel.

36. Which one of the following is/are observed when lead(II) nitrate is heated in a test tube?
1. Reddish-brown residue.
2. Brown fumes.
3. Gas that relights a glowing splint.
4. Liquid formed on the cold part of the tube.

37. Which of the following substances in aqueous solution will turn litmus red?

1. Sodium chloride.
2. Sulphur dioxide.
3. Sodium ethanoate.
4. Carbondioxide.

38. Which one of the following carbonates are soluble in water?
1. Sodium carbonate.
2. Potassium carbonate.
3. Ammonium carbonate.
4. Calcium carbonate.

39. Magnesium is in group II of the Periodic Table. Magnesium oxide has
1. an ionic structure.
2. a molecular structure.
3. a high melting point.
4. a low melting point.

40. Which of the following is/are the purest forms(s) of iron?
1. Steel.
2. Pig iron.
3. Slag.
4. Wrought iron.

*Each of the questions **41** to **50** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*

Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*

*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*

*C. if the assertion is **true** but the reason is **not** a correct statement.*

*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion	**Reason**
A. True	True (reason is a correct explanation.)
B. True	True (Reason is **not** a correct explanation.)
C. True	Incorrect.
D. Incorrect	True.

41.

Graphite and diamond are allotropes of carbon	**because**	they are both black.	☐

42.

When chlorine is bubble into potassium iodine solution, iodine is liberated	**because**	iodine is less reactive than chlorine.	☐

43.

Soap can remove both dirt and oil from cloth	**because**	soap is made from cooking oil.	☐

44.

The presence in water of dissolved sodium hydrogen carbonate does not make water hard	**because**	all sodium salts are soluble.	☐

45.

Concentrated sulphuric acid is used to dry ammonia gas	**because**	it is hygroscopic.	

46.

When ethane burns in air, it produces a smoky flame	**because**	of the presence of unburnt carbon.	☐

47.

Carbondioxide puts off burning magnesium	**because**	carbondioxide does not support combustion.	☐

48.

The amount of carbondioxide in the air is approximately constant	**because**	carbondioxide is produced during burning.	☐

49.

Sodium metal is stored under oil	**because**	it reacts with light.	☐

50.

Sulphur dioxide is added as a preservative to foodstuffs and fruit squashes	**because**	it is soluble in water.	☐

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1998 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. Potassium aluminium sulphate (potash alum) is used during the purification of water for
A. removing colouring matter.
B. killing harmful bacteria.
C. removing suspended matter.
D. making water soft.

2. The electronic configurations of elements W and X are 2:8:3 and 2:6 respectively. The formula of the compound formed between W and X is
A. W_3X.
B. W_2X_3.
C. W_2X.
D. WX_3.

3. Which one of the following nitrates does **not** produce nitrogen when heated strongly?
A. KNO_3.
B. $Ca(NO_3)_2$.
C. NH_4NO_3.
D. $Cu(NO_3)_2$.

4. 20 cm^3 of 0.2 M HCl reacts with 25cm^3 of sodium hydroxide solution. The molarity of the hydroxide is
A. $\frac{25x0.2}{20}$
B. $\frac{20x0.2}{25}$
C. $\frac{25}{20x0.2}$
D. $\frac{20}{25x0.2}$

5. A mixture of carbon monoxide, ammonia and carbon dioxide was bubbled through lime water. Which one of the following gases were not absorbed?
A. Carbon dioxide.
B. Carbon monoxide.
C. Carbon monoxide and ammonia.
D. Carbon dioxide and ammonia.

6. The percentage composition of nitrogen in ammonium nitrate, NH_4NO_3 is
(N=14; H=1; O=16)
A. $\frac{14}{80}$ x100
B. $\frac{28}{80}$
C. $\frac{52}{80}$ x100

D. $\frac{76}{80}$ x100

7. Which one of the following gases is dried using calcium oxide?
A. Sulphur dioxide.
B. Hydrogen chloride.
C. Ammonia.
D. Hydrogen.

8. Which one of the substances below conducts electricity in the solid state?
A. Graphite.
B. Sulphur.
C. Iodine.
D. Phosphorus.

9. Sulphuric acid reacts with zinc according to the equation:
$Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnSO_{4(aq)}\ H_{2(g)}$
The number of moles of zinc that will react with excess sulphuric acid to produce $60cm^3$ of hydrogen at room temperature is (1 mole of gas occupies $24dm^3$ at room temperature).
A. 0.0025
B. 0.005
C. 0.025
D. 0.05

10. The term **oxidation** means
A. addition of electron(s) to a substance.
B. addition of hydrogen to a substance.
C. removal of oxygen from a substance.
D. removal of electron(s) from a substance.

11. Which one of the following elements can reduce aluminium oxide when heated together strongly?
A. Calcium.
B. Lead.
C. Iron.
D. Copper.

12. When dilute nitric acid followed by silver nitrate solution were added to a certain solution, a white precipitate which darkens when exposed to sunlight was formed. The solution contained a
A. sulphate.
B. chloride.
C. nitrate.
D. carbonate.

13. Which one of the following is **not** an acidic oxide?
A. Carbon dioxide.
B. Carbon monoxide.
C. Sulphur dioxide.
D. Phosphorus (V) oxide.

14. When 8 grams of a salt was dissolved in 100 g of water the temperature decreased by 10^oC. The drop in temperature when 2 grams of the salt is dissolved in 100 g of water would be
A. $10\ ^oC$.
B. $8.5\ ^oC$.
C. $5.0\ ^oC$.
D. $2.5\ ^oC$.

15. The boiling points of some gases are given below

Gas	Boiling point ^oC.
Helium	-269
Nitrogen	-196
Oxygen	-183

Xenon -108

When a liquid mixture of above gases is fractionally distilled, which one of the them will vaporise first?
A. Xenon.
B. Helium.
C. Oxygen.
D. Nitrogen.

16. The diagram below shows part of the Periodic Table and the positions of some elements Q, R, T, X in the table. The letters are not true symbols of the elements.

Group	**I**	**II**				**III**	**IV**	**V**	**VI**	**VII**	**VIII**
	Q	R								T	
	X										

The most electropositive element is
A. Q.
B. R.
C. T.
D. X.

17. Which one of the following salts can be best prepared by precipitation?
A. Sodium chlorine.
B. Lead (II) chloride.
C. Potassium chloride.
D. Copper (II) chloride.

18. Which one of the following substances is not used in the extraction of iron?
A. Coke.
B. Air.
C. Silica.
D. Limestone.

19. Which one of the following substances is a synthetic fibre?
A. Nylon.
B. Starch.
C. Rubber.
D. Wool.

20. What is the correct equation for the reaction between chlorine and heated steel wool?
A. $Cl_{2(g)} + 2Fe_{(s)} \rightarrow 2FeCl_{(s)}$
B. $Cl_{2(g)} + Fe_{(s)} \rightarrow FeCl_{2(s)}$
C. $3Cl_{2(g)} + 2Fe_{(s)} \rightarrow 2FeCl_{3(s)}$
D. $3Cl_{2(g)} + 4Fe_{(s)} \rightarrow 2Fe_2Cl_{3(s)}$

21. Potassium chlorate decomposes according to the equation:
$2KClO_{3(s)} \rightarrow 2KCl + 3O_{2(g)}$
The loss in mass in grams when two moles of potassium chlorate are decomposed is
(K=39, Cl=35.5, O=16)
A. 16
B. 32
C. 48
D. 96

22. Which one of the following substances when heated does **not** undergo permanent change?
A. Iodine.
B. Copper (II) nitrate.
C. Zinc oxide.

D. Calcium carbonate.

23. Chlorine atom has electronic configuration of 2, 8, 7. The electronic configuration of a chlorine ion (Cl^-) is
A. 2:8:7
B. 2:8:8
C. 2:8:6
D. 2:8:5

24. The fountain experiment can be demonstrated with ammonia because ammonia
A. reacts readily with water.
B. is a very soluble gas in water.
C. is lighter than air.
D. is denser than air.

25. One of the disadvantages of using detergents for washing is, they
A. are precipated in hard water to form scum.
B. sometimes cause stains on clothes.
C. cause water pollution in rivers and lakes.
D. wash away the colour of clothes.

26. The colourless gas produced during fermentation of sugar is
A. ammonia.
B. carbondioxide.
C. hydrogen.
D. oxygen.

27. Which one of the following substances given below can burn in carbondioxide?

A. Magnesium.
B. Aluminium.
C. Zinc.
D. Lead.

28. Which one of the following hydrocarbon contains multiple bonds?
A. CH_4.
B. C_2H_2.
C. C_2H_4.
D. C_3H_4.

29. Which one of the following solutions form a precipitate when heated?
A. Calcium hydrogen carbonate.
B. Potassium hydrogen carbonate.
C. Sodium hydrogen carbonate.
D. Ammonium carbonate.

30. Graphite is used as an electrode in electrolysis because it
A. has hexagonal carbon rings.
B. is soft.
C. has mobile electrons.
D. is opaque.

31. Which one of the following is formed at the cathode during electrolysis of dilute sodium chloride using platinum electrodes?
A. Sodium.
B. Hydrogen.
C. Chlorine.
D. Oxygen.

32. Which one of the following ions when reacted with ammonia will form a blue precipitate that dissolves to give a deep blue solution?

A. Iron (II)
B. Copper (II)
C. Iron (III)
D. Zinc (II)

33. Calcium carbonate reacts with hydrochloric acid according to the equation:
$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$.
The volume of carbon dioxide evolved at s.t.p. when 1 g of calcium carbonate is reached with excess hydrochloric acid is (Ca=40, C=12, O=16, 1 mole of gas occupies 22.4dm^3 at s.t.p.)
A. 2240 cm^3.
B. 224 cm^3.
C. 112 cm^3.
D. 448 cm^3.

34. A colourless gas which decolourises bromine water is
A. chlorine.
B. ethene.
C. sulphur dioxide.
D. ethane.

35. Hydrogen peroxide decomposes according to the equation:
$2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$.
How many moles of oxygen are given out when 17.0 g of hydrogen peroxide is completely decomposed? (H=1, O=16)

A. 0.25
B. 0.50
C. 0.75
D. 1.0

36. Ethanol burns in oxygen according to the equation
$C_2H_5OH + 7/2\ O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_{2(g)}\ \Delta H + -1185$ kJ.
Calculate the amount of heat given out when 0.2 moles of ethanol is burned completely.
A. –237 kJ.
B. –592.5 kJ.
C. –1185 kJ.
D. –2370 kJ.
37. The boiling points and the melting points of substances P, Q, R and S are given in the table below:

Substance	Melting Point ^{o}C	Boiling Point ^{o}C
P	+17	+45
Q	+185	+500
R	-33	+13
S	0	+100

Which one of the substances is a gas at room temperature?

A. P
B. Q
C. R
D. S

38. Which one of the following acids will react with calcium carbonate to produce the least volume of carbon dioxide gas/
A. Dilute sulphuric acid.
B. Dilute nitric acid.
C. Dilute hydrochloric acid.
D. Dilute ethanoic acid.

39. Hydrogen chloride reacts with silver nitrate according to the following equation:

$HCl_{(g)} + AgNO_{3(aq)}$ ➔ $AgCl_{(s)} + HNO_{3(aq)}$.
The mass of Silver Chloride produces when 1.2 dm^3 of hydrogen chloride is bubbled through silver nitrate at room temperature is

A. $\frac{1.2}{143.5x24}$

B. $\frac{143.51.2}{24}$

C. $\frac{24}{143.5x1.2}$

D. $\frac{143.5x24}{1.2}$

40. Which one of the following can be used to test for ethane?
A. Lime water.-
B. Bromine water.
C. Glowing water.
D. Potassium dichromate paper.

*In each questions **41** to **45** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer A, B, C or D according to the following.*

A. if 1, 2, 3 only are correct.
B. if 1, 3 only are correct
C. if 2, 4 only are correct.
D. if 4 only is correct.

INSTRUCTIONS SUMMARISED:

Instruction Summarised			
A	**B**	**C**	**D**
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

41. Which of the following gases will decolorize acidified potassium manganese(VII)?
1. C_2H_4.
2. CO_2.
3. SO_2.
4. H_2S.

42. Which one of the following is formed when chlorine is bubbled in sodium hydroxide solution?
1. NaCl.
2. NaOCl.
3. HCl.
4. HClO.

43. Which of the following sulphates when heated formed a gas that turns potassium dichromate green?
1. Sodium sulphate.
2. Iron (III) sulphate.
3. Ammonium sulphate.
4. Zinc sulphate.

44. Which one of the following elements belong to the same group in the Periodic Table?
1. $^{15}_{7}M$.
2. $^{24}_{12}X$.
3. $^{35}_{17}R$.
4. $^{19}_{9}Y$.

45. Which one of the following substance(s) is/are formed when copper (II) nitrate is heated strongly?

1. Copper (II) oxide.
2. Nitrogen dioxide.
3. Oxygen.
4. Copper metal.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

46.

Water and alcohol can be separated by fractional distillation	**because**	they have different boiling points.

47.

Ammonia gas turns moist red litmus paper blue	**because**	it is a volatile gas.

48.

Lead (II) chloride is prepared by double decomposition	**because**	lead (II) chloride is a soluble salt.

49.

Concentrated sulphuric acid is not used for drying ammonia	**because**	ammonia is alkaline.

50.

Chlorine water bleaches dyes	**because**	it is a reducing agent.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 1999 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. Which one of the following substances is a deliquescent substance?
   A. Calcium chloride.
   B. Sodium carbonate.
   C. Cobalt (II) chloride.
   D. Iron (II) sulphate.

2. Permanent hard water can be softened by
   A. boiling the water.
   B. adding calcium hydroxide.
   C. adding aqueous ammonia.
   D. adding sodium carbonate.

3. Which one of the following salts can be prepared by synthesis?
   A. Sodium chloride.
   B. Sodium sulphate.
   C. Sodium carbonate.
   D. Sodium nitrate.

4. The solubility of copper (II) sulphate at 30 ^{o}C is 25 g per 100 g of water. The mass of Copper (II) sulphate that would crystallise if a solution containing 50 g of copper (II) sulphate in 100 g of water at 60 ^{o}C is cooled to 30 ^{o}C is
   A. 12.5 g.
   B. 25.0 g.
   C. 50.0 g.
   D. 75.0 g.

5. Carbon dioxide is produced from sodium hydrogen carbonate according to the following equation:
   $2NaHCO_{3(g)} \xrightarrow{heat} Na_2CO_{3(s)} + H_3O_{(l)} + CO_{2(g)}$.
   The volume in litres of carbon dioxide evolved at s.t.p. when 21.0 g of sodium hydrogen carbonate is heated is [$NaHCO_3$=84, 1 mole of gas at s.t.p. occupies 22.4 litres]
   A. $(\frac{21}{168} \text{ x } \frac{1}{2} \text{ x} 22.4)$ l.
   B. $(\frac{168}{21} \text{ x } 2 \text{ x } \frac{1}{22.4})$ l.
   C. $(\frac{21}{84} \text{ x } \frac{1}{2} \text{ x} 22.4)$ l.
   D. $(\frac{84}{21} \text{ x } 2 \text{ x } \frac{1}{22.4})$ l.

6. Sulphuric acid reacts with ammonia according to the following equation:

$2NH_{3(g)} + H_2SO_{4(l)} \rightarrow (NH_4)_2SO_{4(s)}$

The mass of ammonium sulphate formed when 6 l of ammonia reacts with excess sulphuric acid is [$(NH_4)_3SO_4$=132, 1 mole of a gas at room temperature occupies 24 litres]

A. 8.25 g
B. 16.50 g.
C. 33.00 g.
D. 66.00 g.

7. The process by which property of rubber is improved by heating it with sulphur is called
A. polymerisation.
B. vulcanisation.
C. catalysis.
D. dehydration.

8. 25.0 cm^3 of a 0.4 M NaOH solution was diluted to 250 cm^3 with distilled water. The molarity of the resultant solution is
A. 0.01.
B. 0.04.
C. 0.02.
D. 0.4.

9. The catalyst used in the manufacture of nitric acid is
A. iron.
B. platinum.
C. iron (III) oxide.
D. vanadium (V) oxide.

10. During the electrolysis of dilute sodium chloride the carbon anode decreases in size because carbon reacts with
A. chlorine.
B. oxygen.
C. sodium.
D. sodium hydroxide.

11. Calculate the relative molecular mass of gas P if 8.4 dm^3 of the gas has a mass of 0.93 g. (1 mole of gas occupies 22.4 dm^3 at s.t.p.)
A. $[\frac{0.93x22.4}{8.4}]$
B. $[\frac{22.4x8.4}{0.93}]$
C. $[\frac{0.93x8.4}{22.4}]$
D. $[\frac{0.93}{22.4x8.4}]$

12. Which one of the following salts when in solution will form a white precipitate with acidified barium nitrate solution?
A. $ZnSO_4$.
B. Na_2SO_3.
C. Na_2CO_3.
D. $ZnCl_2$.

13. Calcium carbonate reacts with hydrochloric acid according to the following equation:
$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$
The mass of $CaCO_3$ that will react completely with 50 c.c of 2M hydrochloric acid is ($CaCO_3$=100)
A. $\frac{2x50x100}{2x1000}$

B. $\frac{2x1000}{50x2x100}$

C. $\frac{50x100}{200x1000}$

D. $\frac{100x50x2}{1000}$

14. Most metals react with dilute mineral acids to form
    A. hydrogen gas only.
    B. the salt of the metal and water.
    C. the salt of the metal only.
    D. the salt of the metal and hydrogen gas.

15. Which one of the following gases can be collected over water?
    A. Hydrogen chloride.
    B. Carbon dioxide.
    C. Ammonia.
    D. Sulphur dioxide.

16. Hydrogen reacts with oxygen according to the equation:
    $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$.
    The volume of oxygen that is required to react with hydrogen to form $40cm^3$ of steam is
    A. 20 cm^3.
    B. 40 cm^3.
    C. 80 cm^3.
    D. 120 cm^3.

17. Which one of the following has the greatest number of atoms? [Cl=35.5; O=16; N=14; H=1]
    A. 1.0 g chlorine.
    B. 1.0 g oxygen.
    C. 1.0 g nitrogen.
    D. 1.0 g hydrogen.

18. Hydrogen sulphide is formed by reacting dilute hydrochloric acid with
    A. iron (II) sulphate.
    B. iron (II) sulphide.
    C. sodium sulphite.
    D. ammonium sulphate.

19. A bottle containing limewater was left open for a long time and a white solid was formed. The white solid is
    A. calcium hydrogen carbonate.
    B. calcium oxide.
    C. calcium sulphate.
    D. calcium carbonate.

20. During the extraction of sodium by the electrolysis of sodium chloride, calcium chloride is added in order to
    A. remove the impurities.
    B. catalyse the reaction.
    C. lower the melting-point of sodium chloride.
    D. prevent oxidation of sodium.

21. Which one of the following compounds does not cause hardness of water?
    A. Calcium sulphate.
    B. Sodium hydrogen carbonate.

C. Magnesium sulphate.
D. Calcium hydrogen carbonate.

22. Which one of the following ions can be confirmed by the brown ring test?
A. Cl^-.
B. NO_3^-.
C. CO_3^{2-}.
D. SO_4^{2-}.

23. Which one of the following products are formed when concentrated nitric acid reacts with copper?
A. Copper oxide, water and nitrogen dioxide.
B. Copper (II) nitrate, water and nitrogen monoxide.
C. Copper oxide, water and nitrogen monoxide.
D. Copper (II) nitrate, water and nitrogen dioxide.

24. How many Cl^- ions surround each Na^+ ion in a sodium chloride crystal?
A. 4
B. 6
C. 8
D. 10

25. Lead (II) chloride can best be prepared by the reaction between
A. lead metal and concentrated hydrochloric acid.
B. lead oxide and dilute hydrochloric acid.
C. lead nitrate and dilute hydrochloric acid.
D. lead carbonate and dilute hydrochloric acid.

26. What would be the overall electrochemical change in an electrochemical cell where Copper and Zinc electrodes are immersed in 1 M sulphuric acid?
A. $Zn_{(s)} + 2H^+_{(aq)} \rightarrow Zn^{2+}_{(aq)} + H_2O_{(l)}$
B. $Cu^{2+}_{(aq)} + Zn_{(s)} \rightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$
C. $Zn_{(s)} \rightarrow Zn^{2+}_{(aq)} + 2e$
D. $Cu_{(s)} \rightarrow Cu^{2+}_{(aq)} + 2e$

27. The graph in figure 1 shows the variation in the volume of hydrogen evolved with time when Zinc reacts with dilute sulphuric acid using Copper(II) sulphate as a catalyst.

The best explanation for the shape of the graph between P and Q is

A. the zinc is used up.
B. the products stopped the reaction.
C. sulphuric acid is used up.
D. the catalyst is used up.

28. Which one of the following oxides below is soluble in both excess sodium hydroxide solution and aqueous ammonia?
A. Al_2O_3.
B. ZnO.
C. PbO.
D. Fe_2O_3.

29. When 2.5 g of a solid is heated, 560 cm^3 of a gas was produced at s.t.p. and a residue of 1.4 g was left. The molecular mass of the gas is (1 mole of gas occupies 22,4 dm^3 at s.t.p.)

A. $\frac{22400x2.5}{560}$ cm^3.

B. $\frac{22400x1.4}{560}$ cm^3.

C. $\frac{22400x1.1}{560}$ cm^3.

D. $\frac{22400}{560}$ cm^3.

30. What is the molarity of sodium hydroxide solution if 30cm^3 of 0.2 M hydrochloric acid just neutralises 20cm^3 of the alkali?

A. $\frac{20}{0.2x30}$

B. $\frac{20x0.2}{30}$

C. $\frac{30}{0.2x20}$

D. $\frac{30x0.2}{20}$

The table below shows the number of protons, electrons and neutrons of atom R, S, T, U and V. Use the information in the table to answer questions 31 to 34.

Atom	No. of protons	No. of electrons	No. of neutrons
R	11	11	12
S	17	17	18
T	18	18	22
U	19	19	20
V	17	17	20

31. Which one of the above atoms are isotopes?

A. R and S.
B. S and T.
C. U and V.
D. S and V.

32. Which atoms form positive ions of the same charge?

A. R and S.
B. R and U.
C. U and V.
D. S and V.

33. Which of the above atoms belong to an inert element?

A. R.
B. S.
C. T.
D. U.

34. If atom R belong to element R and atom V belonged to element V, what would be the formula of the compound formed between element R and V?

A. RV.
B. R_2V.
C. RV_2.
D. R_2V_3.

35. The formula of the oxide formed when steam is passed over heated iron is

A. FeO.
B. Fe_2O_3.
C. $Fe(OH)_3$.
D. Fe_3O_4.

36. Which one of the following ions forms a green precipitate with excess sodium hydroxide?
A. Fe^{3+}.
B. Fe^{2+}.
C. Cu^{2+}.
D. Zn^{2+}.

37. Which one of the following nitrates does not decompose on heating?
A. Copper nitrate.
B. Lead nitrate.
C. Sodium nitrate.
D. Silver nitrate.

38. A gas that when bubbled through bromine water changes the colour of bromine water from reddish-brown to colourless is
A. methane.
B. ethane.
C. ethane.
D. hydrogen.

39. An acid X_2SO_4 ionises as $X_2SO_{4(aq)} \rightarrow 2H^+_{(aq)} + SO^{2-}_{4\ (aq)}$. The basicity of the acid is
A. 1
B. 2
C. 3
D. 4

40. Which one of the following sets contains neutral fibres only?
A. Nylon, wool, cotton.
B. Cotton, nylon, silk.
C. Silk, nylon, wool.
D. Cotton, wool, silk.

Each of the questions 41 to 45 consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.
Select:

A. if both the assertion and the reason are true statements and the reason is a correct explanation of the assertion.
B. if both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion.
C. if the assertion is true but the reason is not a correct statement.
D. if the assertion is not correct but the reason is a correct statement.

INSTRUCTIONS SUMMARISED

Assertion		Reason
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is not a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

41.

The molar heats of neutralisations of strong acids with strong alkalis are all approximately equal	because	the only reaction involved is H^+ combining with OH^- to form water.	

42.

Chlorine bleaches dyes	because	Chlorine is an oxidising agent.	

43.

Sodium , lithium and potassium are in the same group of the periodic table	because	they are all metals.	

44.

Alkali metals are stored under oil	because	they melt and boil at low temperature compared with other metals.	

45.

Nitrogen is a chemically inert substance	because	nitrogen is diatomic.	

In each of the questions 46 to 50 one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:

C. If 1, 2 and 3 only are correct.
D. If 1 and 3 only are correct.
E. If 2 and 4 only are correct.
F. If 4 only is correct.

Instruction Summarised			
A	B	C	D
1, 2, 3	1, 3	2, 4	4
only correct	only correct	only correct	only correct

46. Which of the following will be dehydrated by concentrated sulphuric acid?
    1. Lime.
    2. Ethanol.
    3. Soda ash.
    4. Sugar.

47. Which one of the following compounds are responsible for causing fur in kettles used for boiling water?
    1. Calcium sulphate.
    2. Calcium carbonate.
    3. Magnesium sulphate.
    4. Magnesium carbonate.

48. Which of the following reaction(s) can occur?
    1. $Pb_{(s)} + 2H^+_{(aq)} \rightarrow Pb^{2+}_{(aq)} + H_{2(g)}$
    2. $Mg_{(s)} + 2H^+_{(aq)} \rightarrow Mg^{2+}_{(aq)} + H_{2(g)}$
    3. $2Al_{(s)} + 6H^+_{(aq)} \rightarrow 2Al^{3+}_{(aq)} + 3H_{2(g)}$
    4. $Cu_{(s)} + 2H^+_{(aq)} \rightarrow Cu^{2+}_{(aq)} + H_{2(g)}$

49. Which one of the following is/are true about mixtures?
    1. Their composition by mass of elements present are fixed.
    2. They are not accompanied by change in mass during formation.
    3. They are accompanied by evolution of heat during formation.
    4. Their compositions by mass of elements present vary.

50. Solid G conducts electricity and has a very high melting point. G is likely to have
    1. metallic structure.
    2. giant molecular structure.
    3. giant atomic structure.
    4. giant ionic structure.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2000 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. The solubility of a solute can be increased by
A. agitating the mixture.
B. adding more solute.
C. adding more solvent.
D. increasing the temperature.

2. Sodium carbonate and Sodium hydrogen carbonate can be separated by fractional crystallisation because the two salts have different
A. densities.
B. solubilities.
C. melting points.
D. boiling points.

3. Which one of the following hydrocarbons has a 90% carbon content (C=12, H=1)?
A. C_3H_4.
B. C_3H_6.
C. C_2H_6.
D. C_3H_8.

4. Two elements have atomic numbers 14 and 8 respectively. The compound formed when they react is most likely to be
A. crystalline with a high melting point.
B. a good conductor of electricity.
C. basic in nature.
D. a molecular gas.

5. Which one of the following is **not** used as a fossil fuel?
A. Hydrogen.
B. Charcoal.
C. Coal.
D. Ethanol.

6. Which one of the following is an oxidation process?
A. Combustion.
B. Hydrogenation.
C. Neutralisation.
D. Saponification.

7. Which one of the following aqueous solutions will produce hydrogen gas with a magnesium ribbon? That of
A. pH=14
B. pH=7
C. pH=11

D. pH=2

8. 15 g of an oxide of lead is strongly heated in a stream of hydrogen gas, leaving 13 g of metallic lead. (Pb=207, O=16). The simplest formula of the oxide is
A. PbO.
B. PbO_2.
C. PbO_3.
D. Pb_2O_3.

9. What mass of the ethane gas (C_2H_6) Mr=30 will occupy the same volume as 8 g of methane gas (CH_4) Mr=16 at s.t.p.? (Molar gas volume=22.4 litres at s.t.p.)
A. $\frac{16}{30}$ x 8
B. $\frac{8}{16}$ x 30
C. $\frac{16}{8}$ x 30
D. $\frac{8}{30}$ x 16

10. Which one of the following structures has a giant ionic structure?
A. Sodium chloride.
B. Hydrogen chloride.
C. Carbon dioxide.
D. Monoclinic sulphur.

11. Which one of the following carbonates decomposes to leave a metal?
A. Potassium carbonate.
B. Magnesium chloride.
C. Zinc carbonate.
D. Silver carbonate.

12. Concentrated sulphuric acid reacts with ethanol to form ethane. This shows that
A. the acid is an oxidising agent.
B. ethane can be converted to ethanol.
C. ethane has a higher affinity for the acid.
D. the acid is dehydrating agent.

13. Which one of the following reagents is used to test for sulphur dioxide?
A. Chlorine water.
B. Acidified potassium permanganate.
C. Cobalt chloride.
D. An hydrous copper sulphate.

14. The rate of the chemical reaction between calcium carbonate and hydrochloric acid can be determined by the
A. concentration of carbon dioxide produced.
B. temperature of carbon dioxide produced.
C. volume of carbon dioxide produced.
D. pressure of carbon dioxide produced.

15. Sodium burns in excess air forming
A. sodium oxide.
B. sodium peroxide.
C. sodium hydroxide.
D. sodium hydride.

16. Which one of the following gases is obtained by fractional distillation?
A. Oxygen.
B. Ammonia.
C. Sulphur dioxide.
D. Hydrogen.

17. When hydrogen is passes over heated copper(II) oxide, a brown solid is formed. This shows that
A. copper is above hydrogen in the activity series.
B. copper is an oxidising agent.
C. hydrogen is a reducing agent.
D. hydrogen is inert towards metals.

18. Electrolysis is applied in
A. refining of crude oil.
B. vulcanisation of rubber.
C. synthesis of polythene.
D. manufacture of sodium hydroxide.

19. What is the mass of sulphuric acid (Mr=98) in 5 cm^3 of a 0.2 M solution of the acid?
A. $\frac{98x5}{0.2x1000}$
B. $\frac{98x0.2x5}{1000}$
C. $\frac{98x0.2}{5x1000}$
D. $\frac{98x5x1000}{0.2}$

20. 6.5 g of an element M, combines with excess oxygen to give 8.1 g of the oxide. The simplest formula of the oxide is… (M=65, O=16).
A. M_2O.
B. MO.
C. MO_2.
D. M_2O_3.

21. 25 cm^3 of M sodium carbonate required 22.70 cm^3 of hydrochloric acid for complete neutralisation. The molarity of the acid id given by
A. $\frac{0.00125x1000}{2x22.7}$
B. $\frac{0.00125x1000}{2x25}$
C. $\frac{0.00125x2}{22.7}$
D. $\frac{0.00125x2x1000}{25}$

22. The best method for separating a mixture of ammonium chloride and sodium chloride is
A. decantation.
B. filtration.
C. distillation.
D. sublimation.

23. The mass of 560cm^3 of a gas X at s.t.p. is 1.10 g. The relative formula mass of the gas is (molar gas volume at s.t.p. is 22.4 dm^3)
A. $\frac{22.4x}{1.1}$ x 560
B. $\frac{1.1}{560}$ x 22.4
C. $\frac{1.1}{22.4}$ x 560
D. $\frac{560}{1.1}$ x 22.4

24. A white solid formed when lime water is left exposed to air for sometime is
A. calcium carbonate.
B. calcium oxide.
C. calcium hydroxide.
D. calcium chloride.

25. Which one of the following metals reacts with nitrogen when heated?
A. Lead.
B. Silver.
C. Copper.
D. Sulphate.

26. A compound reacts with concentrated sulphuric acid to give a colourless gas which fumes with ammonia. The compound contains a
A. chloride.
B. carbonate.
C. nitrate.
D. sulphate.

27. Carbon monoxide reacts with hydrogen according to the equation:
$CO_{(g)} + 2H_{2(g)}$ ➔ $CH_3OH_{(l)}$. $\Delta H=+91kJ$.
What mass of carbon monoxide would cause a heat change of +182kJ. (C=12, O=16)?
A. 2 g.
B. 28 g.
C. 56 g.
D. 273 g.

28. Increasing concentration increases the rate of a reaction because the particles
A. move faster.
B. collide more often.
C. have more energy.
D. collide with more force.

29. The formula of rust is
A. FeO(OH)..
B. $FeO•nH_2O$.
C. $Fe_2O_3•nH_2O$.
D. $Fe_2O_3(OH)$.

30. Which one of the following substances will react with magnesium to give hydrogen?
A. Dilute hydrochloric acid.
B. Aqueous ammonia.
C. Potassium hydroxide.
D. Ethanol.

31. A compound has the formula $M_2(PO_4)_3$. To which group of the Periodic Table does the element M belong?
A. II.
B. III.
C. IV.
D. V.

32. 13.70 kJ of heat was evolved when 4.0 g of copper was displaced from copper(II) sulphate solution by zinc. The amount of heat evolved when one mole of copper was displaced is
A. $\frac{63.5x4}{13.7}$
B. $\frac{13.7x63.5}{4}$
C. $\frac{13.7x4}{63.5}$
D. $\frac{63.5}{13.7x4}$

33. The element M belongs to group IV in the periodic table. The formula of the oxide of M is
A. M_2O_3.
B. M_2O_5.
C. M_2O.
D. MO_2.

34. Which one of the metal atoms whose electronic structures given below forms a nitrate of the type $M(NO_3)_2$?
A. 2:8:0
B. 2:8:1
C. 2:8:2
D. 2:8:3

35. Which one of the following substances in an example of an allotrope?
A. Copper.
B. Bronze.
C. Sulphur.
D. Solder.

36. Which one of the following atomic numbers will indicate the least reactive element?
A. 2:8:1
B. 2:8:2
C. 2:8:7
D. 2:8:8

37. An example of a non-biodegradable substance is
A. silk.
B. wool.
C. polythene.
D. paper.

38. Dry air was passed through sodium hydroxide solution and then over heated copper metal. The residual gas consists of
A. oxygen.
B. carbon dioxide.
C. water vapour.
D. nitrogen.

39. Which one of the following oxides is amphoteric?
A. Calcium oxide.
B. Aluminium oxide.
C. Sodium oxide.
D. Copper oxide.

40. During the extraction of Sodium, the reaction that takes place at the anode is
A. $Na^+_{(aq)} + e \rightarrow NaCl$.
B. $NaCl_{(s)} \rightarrow Na^+_{(aq)} + Cl^-_{(aq)}$.
C. $Cl^-_{(aq)} - e \rightarrow Cl$.
D. $Na_{(l)} \rightarrow Na^+_{(aq)} + e$.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

- *C. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
- *D. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
- *E. if the assertion is **true** but the reason is **not** a correct statement.*
- *F. if the assertion is **not** correct but the reason is a correct statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

41.

Graphite is a soft substance	**because**	it has weak intermolecular forces.	

42.

In the contact process, sulphur trioxide is dissolved in concentrated sulphuric acid instead of water	**because**	sulphur trioxide fumes in water giving out a lot of heat..	

43.

A 2M ethanoic acid is a weak acid	**because**	the acid ionises only slightly in water.	

44.

Iodine is formed when chlorine gas is bubbled into a solution of potassium iodine	**because**	chlorine gas reduces the iodine ions into the solution.	

45.

Sulphuric acid id a strong acid	**because**	sulphuric acid id highly molecular.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

G. If 1, 2 and 3 only are correct.
H. If 1 and 3 only are correct.
I. If 2 and 4 only are correct.
J. If 4 only is correct.

46. Iron is prevented from rusting by
1. greasing.
2. electroplating.
3. galvanising.
4. neutralising.

47. Ammonia gas may be dried using
1. concentrated sulphuric acid.
2. calcium hydroxide.
3. calcium chloride.
4. calcium oxide.

48. Which of the following contains the same volume as 8.0 g of oxygen at s.t.p?
1. 17.0 g of ammonia.
2. 22.0 g of carbon dioxide.
3. 2.0 g of hydrogen.
4. 14.0 g of nitrogen.

49. A calcium ion possesses
1. 20 protons.
2. 22 electrons.
3. 20 neutrons.
4. 40 neutrons.

50. When hydrogen reacts with copper(II) oxide
1. copper(II) oxide is reduced.
2. hydrogen is reduced.
3. hydrogen is oxidised.
4. copper is oxidised.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2001 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. Which one of the following metals reacts with water at ordinary temperature to give hydrogen?
A. Aluminium.
B. Calcium.
C. Zinc.
D. Iron.

2. An example of a gas which acts as an oxidising agent is
A. carbon dioxide.
B. chlorine.
C. sulphur.
D. ammonia.

3. Methanol burns in excess air according to the equation
$2CH_3OH_{(l)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 4H_2O_{(l)}$. $\Delta H=-730kJ\ mol^{-1}$.
The amount of heat liberated when 3.2 g of methanol, (Mr.=32.0) is completely burnt is
A. 73 kJ.
B. 730 kJ.
C. 1416 kJ.
D. 2929 kJ.

4. The role of coke in the extraction of iron in the blast furnace is to
A. produce carbon monoxide which reduces the oxides.
B. produce quick lime which combines with silica.
C. combine with iron to form steel.
D. reduce excessive heat produced in the furnace.

5. Which one of the following substances is produced during the electrolysis of brine?
A. Sodium sulphate.
B. Sodium oxide.
C. Sodium peroxide.
D. Sodium hydroxide.

6. Which one of the following salts is soluble in water?
A. Lead carbonate.
B. Sodium carbonate.
C. Barium carbonate.
D. Calcium carbonate.

7. Element M belongs to group III of the Periodic Table. The most likely formula of its oxide is
A. M_2O.
B. MO_3.
C. M_3O_2.
D. M_2O_3.

8. Which one of the elements with the following atomic numbers reacts most vigorously with water?
A. 2:8:1
B. 2:8:2
C. 2:8:8:1
D. 2:8:8:2

9. The best reason for including water in the laboratory preparation of chlorine is to
A. remove chlorine gas.
B. cool chlorine gas.
C. cool hydrogen chloride gas.
D. remove hydrogen chloride gas.

10. Which one of the following processes does **not** release carbon dioxide?
A. Combustion.
B. respiration.
C. Photosynthesis.
D. Fermentation.

11. Ammonia is oxidised by copper (II) oxide according to the equation
$2NH_3(g) + 3CuO_{(s)} \rightarrow 3H_2O_{(l)} + N_{2(g)} + 3Cu_{(s)}$.
What volume of ammonia will be oxidised by 6.0 g of copper (II) oxide at s.t.p.? (one mole of a gas at s.t.p. occupies 22400 cm^3)
A. $\frac{80}{6} \times \frac{3}{2} \times 22400$
B. $\frac{80}{6} \times \frac{2}{3} \times 22400$
C. $\frac{6}{60} \times \frac{3}{2} \times 22400$
D. $\frac{6}{80} \times \frac{2}{3} \times 22400$

12. Which one of the following compounds is used as catalyst in the manufacture of sulphur trioxide?
A. Alumina.
B. Vanadium (V) oxide.
C. Manganese (IV) oxide.
D. Iron powder.

13. During the manufacture of sugar, which one of the following processes is used to remove the brown colour?
A. Recrystallisation.
B. Filtration.
C. Evaporation.
D. Precipitation.

14. Which one of the following gases reduces hot Copper (II) oxide to copper:
A. Carbon dioxide.
B. Carbon monoxide.
C. Nitrogen dioxide.
D. Nitrogen monoxide.

15. a catalyst is a substance which
A. controls the concentration of reactants.
B. stops a reaction from becoming violent.
C. increases the rate of a chemical reaction.
D. neutralises a base.

16. Which one of the following best explains why graphite and diamond differ?
A. Graphite is impure carbon.
B. Their densities are not the same.
C. All the four valency electrons of graphite are used in covalent bonding.
D. Their atomic structures are different.

17. When copper powder is shaken with aqueous silver nitrate the colour of the solution turns to
A. brown.
B. colourless.
C. blue.
D. green.

18. What volume of ammonia at s.t.p. will be produced when $15cm^3$ of nitrogen reacts completely with hydrogen according to the equation
$N_2(g) + 3H_{2(g)} \rightarrow 2NH_{3(g)}$?
A. 7.5 cm^3.
B. 15 cm^3.
C. 30 cm^3.
D. 45 cm^3.

19. Dilute nitric acid reacts with copper to produce
A. copper nitrate, water and nitrogen dioxide.
B. copper nitrate, water and nitrogen monoxide.
C. copper nitrate, water and ammonia.
D. copper nitrate, water and hydrogen.

20. Which one of the following salts is soluble in water?
A. Lead chloride.
B. Calcium sulphate.
C. Sodium nitrate.
D. Barium carbonate.

21. Isotopes of an element have got
A. same number of protons and neutrons.
B. same number of electrons and neutrons.
C. different number of electrons and protons.
D. same number of electrons and protons.

22. Which one of the elements whose atomic numbers are given below gives an acidic oxide?
A. 2:8:1
B. 2:8:3
C. 2:8:6
D. 2:8:8:2

23. Zinc reacts with hydrochloric acid according to the equation:
$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$.
The volume of hydrogen liberated at s.t.p. when 13.0 g of Zinc react completely with the acid is
A. $\frac{65}{22.4}$ x 13
B. $\frac{13}{65}$ x 22.4
C. $\frac{13}{65x22.4}$
D. $\frac{65x22.4}{13}$

24. The product formed when silver nitrate is heated until there is no further change is
A. silver oxide, nitrogen dioxide and oxygen.
B. silver metal, nitrogen dioxide and oxygen.
C. silver metal and nitrogen dioxide.
D. silver oxide and nitrogen dioxide.

25. An acid accidentally spilled on a pupil's clothes is best neutralised by a solution of pH
A. 1
B. 4

C. 5
D. 8

26. $25cm^3$ of a 0.25M acid required $25cm^3$ of 0.5M sodium hydroxide solution for neutralisation. The basicity of the acid is
A. 1
B. 2
C. 3
D. 4

27. A white precipitate was formed when an aqueous solution of a salt was reacted with aqueous barium nitrate. The white precipitate dissolved in nitric acid. The anion in the salt is
A. SO_3^{2-}.
B. NO_3^-.
C. SO_4^{2-}.
D. Cl^-.

28. An oxide of metal Q can be reduced by metal K but not by metal Z. The order of the reactivity of these metals is
A. Z, K, Q.
B. K, Z, Q.
C. Q, K, Z.
D. K, Q, Z.

29. Which one of the following substances is used to catalyse the rate of decomposition of hydrogen peroxide?
A. Copper (II) sulphate.
B. Manganese (IV) oxide.
C. Vanadium (V) oxide.
D. Finely divided iron.

30. In which of the following processes does oxidation **not** occur?
A. Burning of biogas.
B. Rusting of iron.
C. Melting of candle wax.
D. Smouldering of phosphorus.

31. Which one of the following properties of hydrogen is applied during its collection by upward delivery?
A. It is slightly soluble in water.
B. It is a gas with low boiling point.
C. It is less dense than air.
D. It forms an explosive mixture with oxygen.

32. Which one of the following carbonates decomposes when heated to give an alkalinic colourless gas?
A. Calcium carbonate.
B. Zinc carbonate.
C. Potassium carbonate.
D. Ammonium carbonate.

33. In which group of the periodic table is the element $^{24}_{12}M$ found?
A. I.
B. II.
C. III.
D. IV.

34. Which one of the following substances can be obtained by a process of hydrogenation of oil?
A. Petroleum.
B. Margarine.

C. Soap.
D. Rubber.

35. When copper (II) nitrate is strongly heated the gases evolved are
A. oxygen and nitrogen.
B. oxygen and nitrogen dioxide.
C. nitrogen and ammonia.
D. ammonia and nitrogen dioxide.

36. Which one of the following properties is not that of paraffin? It is
A. a solvent.
B. a fuel.
C. more dense than water.
D. volatile.

37. The product formed when a candle burns in excess air is
A. carbon monoxide.
B. methane.
C. water vapour.
D. soot.

38. Carbon burns in excess oxygen according to the equation:
$C_{(s)} + O_{2(g)}$ ➔ $CO_{2(g)}$. ΔH=-393 kJ mol^{-1}.
What mass of carbon in grams would produce 750 kJ of energy?
A. $\frac{393x12}{750}$
B. $\frac{750x12}{393000}$
C. $\frac{750x12}{393}$
D. $\frac{750x393}{12}$

39. Which one of the following metal oxides is reduced by carbon?
A. Magnesium oxide.
B. Sodium oxide.
C. Calcium oxide.
D. Iron oxide.

40. Lead and silver nitrates are frequently used as reagents because
A. other metals nitrates are insoluble.
B. most nitrates of metal never decompose on heating.
C. other salts of lead and silver are insoluble.
D. they are the most suitable.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

- *C. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
- *D. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
- *E. if the assertion is **true** but the reason is **not** a correct statement.*
- *F. if the assertion is **not** correct but the reason is a correct statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	True.

41.

Wrought iron is made by heating pig iron with haematite	**because**	haematite oxidises most of the impurity in pig iron gaseous oxides.	

42.

Hydrogen chloride gas conducts electricity when in solution	**because**	the gas consists o0f ions..	

43.

Equal volumes of different gases at s.t.p. contain the same number of molecules	**because**	gases are composed of tiny fast moving particles.	

44.

Oxygen molecule is diatomic	**because**	It has a high melting point.	

45.

Permanent hardness of water is caused by the presence of magnesium and calcium ions in water	**because**	these elements form sulphate compounds.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

G. If 1, 2 and 3 only are correct.
H. If 1 and 3 only are correct.
I. If 2 and 4 only are correct.
J. If 4 only is correct.

46. Which one of the following substances reacts with heated lead (II) oxide?
1. Hydrogen gas.
2. Copper metal.
3. Carbon.
4. Oxygen gas.

47. The element with atomic number 7
1. is a non-metal.
2. has a relative atomic mass 7.
3. forms acidic oxides.
4. reacts by loss of electrons.

48. Which of the following substances does **not** exhibit allotropy?
1. Carbon.
2. Sulphur.
3. Phosphorus.
4. Chlorine.

49. During electrolysis of dilute hydrochloric acid using carbon electrodes
1. oxygen is given off at the anode.
2. chlorine is given off at the anode.
3. hydrogen is given off at the cathode.
4. the pH of the acid decreases.

50. When zinc metal is placed in a solution of copper (II) sulphate
1. a brown solid is formed.
2. a colourless gas is evolved.
3. the solution fades in colour.
4. no observable reaction is made.

****

545/1 CHEMISTRY PAPER 1 Nov./Dec. 2002 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*
*Do **not** use pencil.*

1. Which one of the following ores is a valuable ore of copper?
A. Malachite. **B.** Siderite.
C. Haematite. **D.** Dolomite.

2. Which one of the following salts is used in water purification?
A. Ammonium nitrate. **B.** Magnesium carbonate.
C. Iron (III) sulphate. **D.** Potassium chloride.

3. Which one of the following substances oxidises iron(II) sulphate in aqueous solution?
A. Chlorine. **B.** Hydrogen.
C. Ammonia. **D.** Nitrogen.

4. Which one of the following statements about graphite is false?
A. It has a layer structure. **B.** It refracts light rays strongly.
C. It is an excellent lubricant in oil. **D.** It has a high density.

5. A steel tank is protected from rusting when it is connected to a metal, M as shown
***
Which one of the following metals is **not** likely to be M?
A. Aluminium. **B.** Zinc.
C. Magnesium. **D.** Copper.

6. Which one of the following statements about sodium hydrogen carbonate is correct?
A. It decomposes to carbon dioxide and hydrogen.
B. It reacts with acids to yield carbon dioxide.
C. Its solution turns milky in carbon dioxide.
D. It does not exist in solid form.

7. Which one of the following anions does **not** form a precipitate with $Pb^{2+}_{(aq)}$?
A. $CO^{2}_{3\,(aq)}$. **B.** $OH^{-}_{(aq)}$.
C. $NO^{-}_{3\,(aq)}$. **D.** $SO^{2-}_{4\,(aq)}$.

8. Which one of the following ions reacts with $Cl^{-}_{(aq)}$ to form a precipitate which dissolves on heating?
A. $Cu^{2+}_{(aq)}$. **B.** $Fe^{2+}_{(aq)}$.
C. $Pb^{2+}_{(aq)}$. **D.** $Ca^{2+}_{(aq)}$.

9. A colourless solution reacts with dilute hydrochloric acid to give a white precipitate. The white precipitate dissolves in warm water. The colourless solution is
A. zinc chloride. **B.** lead nitrate.
C. magnesium sulphate. **D.** sodium carbonate.

10. The percentage of phosphorus in H_3PO_3 is given by the expression:

A. $\frac{82x100}{31}$ **B.** 31 x 82 x 100

C. $\frac{31x100}{82}$ **D.** $\frac{82x31}{100}$

11. Calcium carbide reacts with water to produce a gas according to the equation:

$CaC_{2(s)} + 2H_2O_{(l)} \rightarrow Ca(OH)_{2(s)} + C_2H_{2(g)}$.

The volume of the gas produced at S.T.P. when 6.4 g of calcium carbide reacts completely is (C=12, Ca=40, 1 mole of gas occupies 22.4 l at s.t.p)

A. $\frac{6.4x64}{22.4}$ **B.** $\frac{22.4}{6.4x64}$

C. 64 x 6.4 x 22.4 **D.** $\frac{6.4x22.4}{64}$

12. Fractional crystallisation can be used to separate a mixture in solution. The substances in the mixture must have

A. a large difference in freezing points. **B.** very low boiling points.

C. a hydroscopic property. **D.** very high molecular masses.

13. The amount of heat evolved when 6.0 g of metal, M was displaced from a solution was 28.8 kJ. The amount of heat produced when 0.5 mole of M was displaced is

A. $\frac{28.8x54.9x0.5}{6.0}$ **B.** $\frac{54.9x6.0}{28.8x0.5}$

C. $\frac{28.8x54.9}{6.0x0.5}$ **D.** 28.8 x 54.9 x 6.0 x 0.5

14. The rate of reaction between zinc and hydrochloric acid can be increased by

A. diluting the hydrochloric acid. **B.** using powder instead of zinc granules.

C. adding $H^+_{(aq)}$ as a catalyst. **D.** placing the reaction vessel in an ice-bath.

15. Sulphur dioxide is used in the following ways except in the

A. bleaching of materials such as wool and silk.

B. treating of wool pulp when manufacturing paper.

C. large-scale production of sulphuric acid.

D. manufacture of vulcanised rubber.

16. Which one of the following oxides has the most ionic structure?

A. P_2O_5. **B.** SiO_2.

C. Al_2O. **D.** Na_2O.

17. Which one of the following processes is **not** used to remove hardness in water?

A. Treatment with sodium carbonate. **B.** Addition of calcium hydroxide.

C. Distillation of water. **D.** Addition of sodium structure.

18. Which one of these salts is **least** soluble in water?

A. $CaCl_{2(s)}$. **B.** $CaCO_{3(s)}$.

C. $Ca(NO_3)_{2(s)}$. **D.** $CaSO_{4(s)}$.

19. The mass of ammonium ion, NH^+_4 in 0.5 M $(NH_4)_2SO_4$ solution is (H=1, N=14, O=16, S=32)

A. 0.5 x 132 **B.** $\frac{132}{2x0.5}$

C. 2 x 0.5 x 18 **D.** $\frac{2x0.5}{36}$

20. Which one of the following will occur when aluminium is added to an aqueous solution of silver nitrate?

A. Heat will be absorbed. **B.** Aluminium hydroxide will be formed.

C. Silver will precipitate out. **D.** Aluminium will form an alloy with silver.

21. Which gas evolves during the fermentation of glucose solution?

A. Ammonia. **B.** Nitrogen dioxide.
C. Carbon dioxide. **D.** Methane.

22. Which one of the following salts is the most soluble in water with increasing temperature?
A. Potassium nitrate. **B.** Sodium chloride.
C. Sodium nitrate. D. Potassium chloride.

23. Ordinary cement is produced by roasting the following mixtures of substances:
A. Limestone and clay. **B.** Sodium carbonate and slaked lime.
C. Calcium chloride and chalk. **D.** Clay and graphite.

24. Which one of the following reactions proceeds fast under ordinary conditions?
A. Iron and water. **B.** Copper (II) oxide and hydrogen.
C. Magnesium and chloride. **D.** Zinc carbonate and nitric acid.

25. The mass of silver nitrate, $AgNO_3$ in 0.2 M solution of the salt is (Ag=108, O=16, N=14)
A. 17.0 **B.** 34.0
C. 85.0 **D.** 170.0

26. The electronic structure of metal M is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$. The formula of the nitrate of the metal is
A. $M(NO_3)_3$. **B.** M_2NO_3.
C. M_3NO_3. **D.** $M_2(NO_3)_3$.

27. Which one of the following oxides is a mixed oxide?
A. Al_2O_3. **B.** ZnO.
C. Fe_3O_4. **D.** Na_2O.

28. When an electric current is passed through molten magnesium chloride, the
A. chloride ions will travel to the anode.
B. magnesium ions will gain electrons from the current.
C. magnesium chloride will glow brightly.
D. magnesium chloride will conduct the current and sublime.

29. Which one of the following processes adds sulphur dioxide into the atmosphere?
A. Burning coal and oil. **B.** Decaying organic matter.
C. Heating limestone in a kiln. **D.** Fractional distillation of liquid air.

30. Glucose burns in oxygen at 25 ^oC according to the equation below, giving out 2802 kJ mol^{-1} of heat energy.

$$C_6H1_2O_{6(s)} + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(g)}.$$

The amount of heat produced when 18.0 g of glucose is burnt in oxygen at the same temperature is (H=1, C=12, O=16)

A. $\frac{2802x18.0}{180x25}$ **B.** $\frac{180}{2802x18.0}$
C. $\frac{180x25x18.0}{2802}$ **D.** $\frac{2802x18.0}{180}$

31. Which one of the following pairs of gases do **not** cause atmospheric pollution?
A. Sulphur dioxide and carbon dioxide. **B.** Helium and hydrogen.
C. Nitrogen dioxide and sulphur trioxide. **D.** Carbon monoxide and carbon dioxide.

32. Zinc displaces copper from an aqueous solution of Copper (II) sulphate according to the equation:

$$CuSO_{4(aq)} + Zn_{(s)} \rightarrow Cu_{(s)} + ZnSO_{4(aq)}.$$

The mass of copper in g that is displaced by 13.10 g of zinc is [Cu= 63.5, Zn= 65.4]
A. 6.35 **B.** 12.72
C. 19.07 **D.** 25.82

33. Which one of the following gases is used to extract iron from its ore?
A. Chloride. **B.** Nitrogen monoxide.
C. Carbon monoxide. **D.** Sulphur trioxide.

34. A white powder is made of 24 percent carbon and 76 percent fluorine atoms. Its simplest formula is (C:12 ; F:19)

A. CF_2. **B.** C_2F_4.
C. CF_3. **D.** CF_4.

35. The mass in g of OH^- ions in 0.25M NaOH solution is (H=1, O=16)

A. $\frac{0.25}{17}$ **B.** 17 x 0.25
C. $\frac{0.25x4}{17}$ **D.** $\frac{17x0.25}{4}$

36. The minimum volume of 1M $HCl_{(aq)}$ required to produce 0.25 g of hydrogen with excess magnesium is

A. 25 cm^3. **B.** 100 cm^3.
C. 250 cm^3. **D.** 1000 cm^3.

37. The separation of substances that make up ink by chromatography depends on the

A. solubilities of the substances in the solvent. **B.** size of the chromatography paper.
C. freezing points of the substances. **D.** osmotic pressure of the solution of ink.

38. Which one of the following statements about the reaction between iron and sulphur is **false**? The reaction

A. is an oxidation-reduction one. **B.** produces iron (II) sulphate.
C. proceeds with evolution of heat. **D.** is induced by heat.

39. When ammonium nitrate is heated, it produces

A. nitrogen dioxide. **B.** ammonia.
C. dinitrogen oxide. **D.** nitrogen monoxide.

40. The reaction of iron and chlorine

A. occurs at ordinary temperature. **B.** requires platinum catalyse.
C. produces iron(II) chloride. **D.** produces iron(III) chloride.

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INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
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C.	True	Incorrect.
D.	Incorrect	True.

41.

In the electrolysis of dilute sulphuric acid, $OH^-_{(aq)}$ is discharged in preference to $SO^{2-}_{4\ (aq)}$	**because**	$SO^{2-}_{4\ (aq)}$ ion carries more charge than $OH^-_{(aq)}$ ion.	

42.

Copper reacts with concentrated nitric acid to produce nitrogen monoxide	**because**	copper is above hydrogen in the electrochemical series.	

43.

Aluminium dissolves readily in aqueous sodium hydroxide solution	**because**	aluminium is a highly electropositive metal.	

44.

Monoclinic sulphur is stable only at a temperature abve 96 ^{o}C	**because**	its atoms are arranged in a layer structure.	

45.

Magnesium has oxidation number of +2	**because**	magnesium lacks six electrons to complete the octet structure.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

A. *If 1, 2 and 3 only are correct.* *B.* *If 1 and 3 only are correct.*
C. *If 2 and 4 only are correct.* *D.* *If 4 only is correct.*

46. When potassium chlorate is heated with manganese dioxide, it decomposes to give
1. oxygen. **2.** chlorine.
3. potassium chlorine. **4.** manganese chloride.

47. Which one of the gases in the atmosphere make(s) rain water acidic?
1. Carbon dioxide. **2.** Sulphur dioxide.
3. Nitrogen dioxide. **4.** Nitrogen monoxide.

48. Which of the following substances can provide hydrogen ions in aqueous solution?
1. NH_4OH. **2.** CH_3COOH.
3. CH_3CH_2OH. **4.** H_2CO_3.

49. Nitric acid shows the following property or properties.
1. Turns litmus blue. **2.** Forms salts with bases.
3. Is a powerful reducing agent. **4.** Produces carbon dioxide with carbonates.

50. When chlorine is dissolved in cold aqueous solution of sodium hydroxide, it produces
1. sodium chlorate (V). **2.** sodium chloride.
3. sodium hydrogen chloride. **4.** sodium chlorate (IV).

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2003 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

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*Do **not** use pencil.*

1. Which one of the following gases dissolves in water to form an acid solution?
A. Nitrogen. B. Ethene.
C. Nitrogen dioxide. D. Carbon monoxide.

2. Which one of the following is observed when magnesium burns in air?
A. A bright flame. B. A white powder.
C. Brown specks. D. Molten beads.

3. Which one of the following is **not** true about an element, m with electronic configuration of 2, 8, 3
A. It conducts heat and electricity. B. It is a metal.
C. It dissolves in dilute acids to give hydrogen. D. Its valencies are 1, 2 and 3.

4. Which one of the following ions is most common in hard water?
A. SO_4^{2-} **B.** CO_3^{2-}
C. Na^+ **D.** Mg^{2+}

5. The following methods can produce calcium oxide except
A. burning calcium in air. B. heating calcium carbonate.
C. heating calcium hydroxide. D. action of water on hydroxide.

6. Which one of the following metals reacts with cold dilute nitric acid?
A. Calcium. B. Copper.
C. Silver. D. Lead.

7. Which one of the following solutions is used to test for sulphate ions in acid condition?
A. Barium nitrate. B. Barium chloride.
C. Silver nitrate. D. Silver chloride.

8. The components of ink can be separated by
A. distillation. B. chromatography.
C. filtration. D. electrolysis.

9. Hydrochloric acid reacts with sodium hydroxide according to the equation:

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

25.0 cm^3 of 0.10 M hydrochloric acid reacted completely with 20cm^3 of sodium hydroxide. What is the molarity of sodium hydroxide?
A. $\frac{25x0.1}{20}$ B. $\frac{20x0.1}{25}$
C. 20 x 0.1 x 25 D. $\frac{20x25}{0.1}$

10. Which one of the following substances is used as a catalyst in the manufacture of nitric acid?
A. Vanadium (V) oxide. B. Manganese (IV) oxide.
C. Platinised asbestos. D. Finely divided iron.

11. $100cm^3$ of nitrogen were reacted with $300cm^3$ of hydrogen at s.t.p. What was the volume of ammonia produced?

A. $100\ cm^3$ B. $200\ cm^3$
C. $300\ cm^3$ D. $400\ cm^3$

12. When 1 g of methanol was burnt in excess air, 22.6 kJ of heat were liberated. What was the quantity of heat in kJ liberated when 1 mole of methanol was burnt under similar conditions?

A. 22.6 B. 32.0
C. 723.2 D. 777.8

13. Which one of the following salts does **not** decompose on heating?

A. Sodium carbonate. B. lead nitrate.
C. Calcium carbonate. D. Zinc nitrate.

14. Which one of the following substances decolourises bromine water?

A. Ammonia. B. Ethene.
C. Methane. D. Chlorine.

15. Which one of the following metals does **not** displace iron from a solution of iron (III) nitrate?

A. Zinc. B. Copper.
C. Magnesium. D. Aluminium.

16. Which one of the following substances conducts electricity?

A. Iodine. B. Graphite.
C. Methyl benzene. D. Tetrachloromethane.

17. Which one of the following gases can reduce copper (II) oxide?

A. Nitrogen. B. Hydrogen.
C. Nitrogen dioxide. D. Carbon dioxide.

18. The volume of carbon dioxide evolved when 6.0 g of carbon are burnt completely i n air at s.t.p. is [C=12, Molar volume= $22400cm^3$ at s.t.p.]

A. $\frac{12x22400}{6}\ cm^3$. B. $\frac{12x6}{22400}\ cm^3$.
C. $\frac{6x22400}{12}\ cm^3$. D. 6 x 12 x 22400 cm^3.

19. Which one of the following pairs of elements can form an ionic bond?

A. Hydrogen and oxygen. B. Potassium and bromine.
C. Copper and zinc. D. Hydrogen and chlorine.

20. An alloy of solder consists of

A. zinc and lead. B. copper and lead.
C. copper and aluminium. D. tin and lead.

21. 20.0 cm^3 of 0.1 M sodium hydroxide solution reacted with 0.1 M of solution Y. The volume of solution Y that reacted completely with the alkali is
[Mole ratio NaOH: Y=2:1]

A. 40 cm^3. B. 30 cm^3.
C. 20 cm^3. D. 10 cm^3.

22. The numbers of protons, electrons and neutrons in aluminium ions, Al^{3+} is

	Protons	**Electrons**	**Neutrons**
A.	27	27	14
B.	13	14	14
C.	13	10	14

D. 10 14 17

23. The formula of the compound formed between elements Q and L is [Q=12, L=15]

A. Q_2L_3. B. Q_2L_5.

C. Q_3L_2. D. QL_3.

24. Which one of the following ions reacts with ammonia to form a precipitate which dissolves in excess ammonia to form a colourless solution?

A. Zn^{2+}. B. Mg^{2+}.

C. Cu^{2+}. D. Fe^{2+}.

25. When heated, copper (II) nitrate decomposes according to the equation:

$2Cu(NO_3)_{(s)} \rightarrow 2CuO_{(s)} + 4NO_{2(g)} + O_{2(g)}$.

The maximum mass of the copper (II) oxide formed when 1.88 g of copper (II) nitrate is heated is [Cu= 64, O= 16, $Cu(NO_3)_2$=188]

A. $\frac{1.88x188}{80}$ B. $\frac{80}{1.88x188}$

C. $\frac{1.88x80}{188}$ D. $\frac{188}{1.88x80}$

26. $20cm^3$ of an acid HX neutralized 25 cm^3 of 0.05 M sodium carbonate solution. The molarity of the acid is

A. $\frac{25x0.05}{20}$ B. $\frac{2x25x0.05}{20}$

C. $\frac{2x20x0.05}{25}$ D. $\frac{20x2}{25x0.05}$

27. 5.3 kJ of heat energy are required to vaporise 13 g of a liquid X (X=78). The molar heat of vaporisation of X in kJ/mole is

A. $\frac{5.3x78}{13}$ B. $\frac{13x78}{5.3}$

C. 13 x 5.3 x 78 D. $\frac{5.3x13}{78}$

28. Which one of the following polymers is a synthetic?

A. Wool. B. Cotton.

C. Sisal. D. Nylon.

29. Which one of the following is **not** produced during the fermentation of sugar solution?

A. Water vapour. B. Carbon dioxide.

C. Methane. D. heat.

30. Zinc nitrate decomposes on heating according to the equation

$2Zn(NO_3)_{2(s)} \rightarrow 2ZnO_{(s)} + 4NO_{2(g)} + O_{2(g)}$.

The maximum volume of oxygen evolved in this reaction at s.t.p. when 7.56 g of zinc nitrate is heated is [Zn=65, N=14, O=16, molar gas volume at s.t.p. = 22.4 dm^3]

A. $\frac{7.56x378}{22.4}$ B. 7.56 x 22.4 x 378

C. $\frac{7.56x22.4}{378}$ D. $\frac{22.4}{7.56x378}$

31. Which one of the following salts can be prepared by precipitation?

A. Ammonium nitrate. B. Silver chloride.

C. Sodium carbonate. D. Zinc sulphate.

32. In which one of the following processes does ethane form a plastic?

A. Polymerisation. B. Precipitation.

C. Neutralisation. D. Electrolysis.

33. A compound contains 53.3% oxygen, 6.7% hydrogen and 40% carbon. The simplest formula of the compound is [C=12, H=1, O=16]

A. CHO. B. CH_2O.

C. C_2H_2O. D. CH_2O_2.

34. An oxide of P contains 50% by mass of P. Its relative molecular mass is 64. What is the formula of the oxide? [P=32, O=16]

A. PO. B. PO_2.
C. P_2O. D. PO_3.

35. Which one of the following hydroxides is normally used in the laboratory to prepare ammonia from ammonium chloride?

A. Sodium hydroxide. B. Calcium hydroxide.
C. Copper (II) hydroxide. D. Iron (II) hydroxide.

36. Which one of the following gases diffuses fastest?

A. CO_2. B. NH_3.
C. HCl. D. NO

37. When 0.4 g ethanol was burnt, it raised the temperature of 0.1 kg of water by 20 ^oC. The heat of combustion of ethanol is
[Specific heat capacity of water=4.2 kJ/kg/^oC, C_2H_5OH=46]

A. $\frac{4.2x20x46}{0.4x0.1}$ kJ mol^{-1} B. $\frac{0.4x4.2x20}{46x0.1}$ kJ mol^{-1}
C. $\frac{0.1x4.2x20x46}{0.4}$ kJ mol^{-1} D. $\frac{0.1x4.2x20}{46x0.4}$ kJ mol^{-1}

38. Which one of the following gases forms white fumes with ammonia?

A. Chlorine. B. Carbon dioxide.
C. Sulphur dioxide. D. Hydrogen chloride.

39. Chlorine dissolves in cold aqueous solution of sodium hydroxide to produce the following substance.

A. Sodium chlorate. B. Sodium chloride.
C. Sodium chlorite. D. Sodium hydrogenchloride.

40. Which one of the following is **not** a property of carbon dioxide?

A. It is slightly soluble in water. B. It forms a precipitate with lime water.
C. It extinguishes burning magnesium ribbon. D. It sublimes when solid.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a correct statement.*

41.

A mixture of ammonium chloride and sodium chloride can be separated by sublimation	**because**	the salts have a common anion.	

42.

Methane burns in air to form carbon dioxide and water	**because**	it contains carbon and hydrogen atoms.	

43.

Concentrated sulphuric acid is used to prepare ribbon faster than magnesium powder	**because**	Sulphuric acid id stronger than hydrochloric acid.	

44.

Hydrochloric acid reacts with magnesium ribbon faster than magnesium powder	**because**	magnesium powder provides a greater surface area of contact.	

45.

Aluminium reacts with heated iron(III) oxide exothermically	**because**	it has three electrons in its outermost shell.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

A. If 1, 2 and 3 only are correct. *B. If 1 and 3 only are correct.*
C. If 2 and 4 only are correct. *D. If 4 only is correct.*

46. The electronic structure of elements P, Q, R and S are as shown in the table below:

Element	**electronic configuration**
P	2:8:2
Q	2:8:7
R	2:8:6
S	2:8:1

Which one of the following pairs of elements will combine to form ionic compound(s)?

1. P and Q.
2. P and R.
3. Q and S.
4. Q and P.

47. Oxidation is a reaction in which

1. oxygen is removed from a substance.
2. hydrogen is removed from a substance.
3. hydrogen is added to a substance.
4. electron is lost from a substance.

48. Which of the following observations take(s) place when copper(II) sulphate is electrolysed using graphite electrodes?

1. Bubbles of a colourless gas are formed at the anode.
2. A brown coating is formed at the anode.
3. The blue colour of copper (II) sulphate fades.
4. The anode dissolves in solution.

49. Which one of the following is/are **true** about an element with atomic mass 11?

1. It forms ionic oxides.
2. It belongs to Group (III) of the Periodic Table.
3. It forms ionic chlorides.
4. It is of a mixed – covalent structure.

50. Hydrogen bromide is aqueous solution shows the following characteristics:

1. Turns litmus solution red.
2. Produces hydrogen with electro-positive metals.
3. Liberated carbon dioxide from carbonates.
4. Behaves as a strong oxidising agent.

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Go to Index | E-mail Designer | FAQs

545/1
CHEMISTRY
PAPER 1
1
Nov./Dec. 2004
1½ **hours**

UGANDA NATIONAL EXAMINATION BOARD
Uganda Certificate of Education
CHEMISTRY
Paper 1
Time: 1½ hours

INSTRUCTIONS TO CANDIDATES:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each page.*

*Do **not** use pencil.*

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1. Element X reacts with chloride to form a compound with formula XCl_4. The formula of the oxide of X is
A. X_2O
B. XO
C. XO_4
D. XO_2

2. The atomic numbers of elements, W, X, Y and Z are; 12, 14, 16 and 18 respectively. Which one of the elements is likely to show properties similar to an element with atomic number 10?
A. W
B. X
C. Y
D. Z

3. The equation that presents an oxidation – reduction reaction is
A. $NH_4Cl_{(s)} \xrightarrow{heat} NH_{3(g)} + HCl_{(g)}.$
B. $2KclO_{3(s)} \xrightarrow{heat} 2KCl_{(s)} + 3O_{2(g)}.$
C. $NaOH_{(aq)} + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + HO_{(l)}.$
D. $2FeCl_{2(aq)} + Cl_{2(g)} \longrightarrow 2FeCl_{3(aq)}.$

4. Lead nitrate decomposes according to the equation:
$2Pb(NO_3)_2 \rightarrow 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}.$
The mass of lead monoxide that is produced when 3.31 g of lead nitrate is completely decomposed is

[N=14, O=16, Pb=207]
A. $\frac{3.31x223}{331}$
B. 3.31 x 223 x 331
C. $\frac{331x223}{3.31}$
D. $\frac{3.31x331}{223}$

5. Carbon burns in oxygen according to the following equation:
$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}.$
The amount of the heat evolved when 480g of carbon is burnt completely in oxygen is
[Molar heat of combustion of carbon is 2.2×10^{-3} kJ mol^{-1}, C=12]
A. 480 x 12 x 2.2 x 10^{-7}
B. $\frac{480x12}{2.2x10^{-7}}$
C. $\frac{2.2x10^{-7}x12}{480}$
D. $\frac{2.2x10^{-7}x480}{12}$

6. Magnesium reacts with hydrochloric acid according to the following equation:
$Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_2 + H_{2(g)}.$
The volume of hydrogen formed at s.t.p. when 2.32 g of magnesium reacts completely with dilute hydrochloric acid is

[Molar gas volume at s.t.p. is 22.4 dm^3, mg=24]

A. $\frac{22.4x2.32}{24}$ dm^3

B. $\frac{22.4x24}{2.32}$ dm^3

C. $\frac{2.32x24}{22.4}$ dm^3

D. 2.32 x 24 x 22.4dm^3

7. Which one of the following hydroxides dissolves in water to form an alkaline solution?
A. Potassium hydroxide.
B. Zinc hydroxide.
C. Lead (II) hydroxide.
D. Copper (II) hydroxide.

8. Zinc reacts with hydrochloric acid according to the following equation:
$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2\,(aq)} + H_{2\,(g)}$.
The number of the moles of hydrochloric acid required to react completely with 7.0 g of zinc is

A. $\frac{65x2}{7.0}$

B. $\frac{7.0x65}{2}$

C. $\frac{7.0x2}{65}$

D. 7.0 x 65 x 2

9. Which one of the following metals is extracted by electrolysis?
A. Zinc.
B. Lead.
C. Sodium.
D. Copper.

10. Under a certain temperature and pressure, hydrogen reacted with nitrogen according to the equation below:
$3H_{2\,(g)} + N_{2\,(g)} \leftrightarrow 2NH_{3\,(g)}$.
The volume of nitrogen required to react with 150cm^3 of hydrogen under the same temperature and pressure is
A. 15.0 cm^3
B. 50.0 cm^3
C. 300.0 cm^3
D. 450.0 cm^3

11. Which one of the following substances will increase in mass when heated in air?
A. Iodine.
B. Calcium.
C. Zinc nitrate.
D. Potassium nitrate.

12. A dilute solution of sodium chloride was electrolysed using carbon electrodes. Which one of the following substances was formed at the anode?
A. Chlorine.
B. Carbon dioxide.
C. Oxygen.
D. Hydrogen chloride.

13. Hydrogen is used on a large-scale to
A. manufacture detergents.
B. harden vegetable oils.
C. reduce metal oxides in extraction of metals.
D. make mining explosives.

14. Beginning with the most reactive, the order of reactivity of the following metals with water is
A. Sodium ➔ magnesium ➔ lead ➔ copper.
B. Magnesium ➔ sodium ➔ copper ➔ lead.
C. Copper ➔ lead ➔ magnesium ➔ sodium.
D. Lead ➔ copper ➔ sodium ➔ magnesium.

15. Which one of the following ions reacts with $NH_{4\,(aq)}$ to form a precipitate that dissolves in excess ammonia solution?
A. $Pb^{2+}_{\,(aq)}$
B. $Fe^{2+}_{\,(aq)}$
C. $Ca^{2+}_{\,(aq)}$
D. $Cu^{2+}_{\,(aq)}$

16. A chromatogram of substances P, Q, R, S, T and a mixture M, was developed as shown in Figure 1.
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Figure 1 shows that the mixture M, consists of
A. P, R and T.
B. R, S and T.
C. P, Q and R.
D. Q, R and S.
17. What name is given to the reaction leading to the formation of soap from oil?
A. Hydrogenation.
B. Polymerisation.
C. Saponification.
D. Degradation.

18. Which one of the following metals can displace zinc from zinc sulphate solution?
A. Cu.
B. Pb.
C. Ca.
D. Ag.

19. A white salt, X, reacts with dilute hydrochloric acid producing brown fumes. When dilute Sulphuric acid is added to the resulting solution, a white precipitate is observed. Salt X is
A. Barium nitrate.
B. Sodium nitrate.
C. Potassium nitrate.
D. Sodium bromide.

20. Which one of the following pairs of substances will produce a precipitation when their aqueous solutions are mixed together?
A. Sodium carbonate and ammonium sulphate.
B. Nitric acid and ammonia.
C. Potassium chloride and calcium nitrate.
D. Lead nitrate and Sulphuric acid.

21. Which one of the following salts is a fertilizer?
A. Potassium chloride.
B. Calcium chloride.
C. Sodium chloride.
D. Copper (II) chloride.

22. The cation that can **not** be reduced by aluminium metal is
A. $Zn^{2+}_{\,(aq)}$
B. $Fe^{2+}_{\,(aq)}$
C. $Mg^{2+}_{\,(aq)}$
D. $Cu^{2+}_{\,(aq)}$

23. The substance that can **not** cause air pollution from the following list is
A. hydrogen sulphate.

B. carbon dioxide.
C. water vapour.
D. Sulphur dioxide.

24. Which one of the following is **not** a property of ammonia? It is
A. an alkaline gas.
B. a reducing agent.
C. soluble in water.
D. is denser than air.

25. The electronic configurations of some elements are shown below.
M 2:6 | **N** 2:5 | **P** 2:8:3 | **Z** 2:8:2
The pair of elements that can form an ionic compound is
A. Z and M.
B. Z and P.
C. Z and N.
D. M and N.

26. The **false** statement about Sulphur dioxide is that sulphur dioxide
A. is a colourless gas.
B. dissolves readily in water.
C. turns moist red litmus to blue.
D. behaves as a bleaching agent.

27. The percentage by mass of phosphorus in calcium phosphate, $Ca_3(PO_4)_2$ is
[O=16, P=31, Ca=40]
A. 8
B. 10
C. 17
D. 20

28. Which one of the following oxides can be reduced by dry ammonia?
A. Copper (II) oxide.
B. Lead oxide.
C. Zinc oxide.
D. Calcium oxide.

29. What mass in grammes, of sodium carbonate – 10 - water ($Na_2CO_3 \bullet 10H_2O$) is contained in $50cm^3$ of 0.1 m solution?
[H=1, C=12, O=16, Na=23]
A. $\frac{106x0.1x100}{50}$
B. $\frac{106x0.1x50}{1000}$
C. $\frac{286x0.1x1000}{50}$
D. $\frac{286x0.1x50}{1000}$

30. When 6.4 g of an oxide of element X was heated and hydrogen passed over it, 3.2 g of the element was produced. The empirical formula of the oxide is
[O=16, X=32]
A. XO.
B. XO_2.
C. X_2O.
D. X_2O_3.

31. Which one of the following statements about copper is **untrue**?
A. Hot concentrated nitric oxidises copper to produce brown fumes.
B. Fumes compounds of copper exists when the valency of copper is 1.

C. Copper forms a basic oxide.
D. Copper is easily displaced by zinc from an aqueous solution of Cu^{2+}.

32. The **incorrect** statement about magnesium is that
A. its chloride is deliquescent.
B. magnesium reacts with sodium hydroxide solution.
C. its oxide has a high melting point.
D. magnesium is produced by electrolysis.

33. The solution that could be containing zinc ions is one that forms a
A. reddish – brown precipitate with magnesium.
B. green precipitate with aqueous ammonia.
C. white precipitate that is soluble in excess sodium hydroxide solution.
D. white precipitate with dilute Sulphuric acid.

34. Ammonia burns in oxygen to yield
A. nitrogen and water.
B. nitric acid.
C. nitrogen and hydrogen.
D. nitric acid, nitrogen and water.

35. Which one of the following processes is **not** involved in the carbon cycle?
A. Respiration.
B. Combustion.
C. Photosynthesis.
D. Lightning.

36. Fuming nitric acid was heated and the gas evolved was collected over water. This gas was
A. nitrogen dioxide.
B. oxygen.
C. nitrogen monoxide.
D. hydrogen.

37. When sodium hydroxide solution was added to an aqueous solution of salt, X, a white precipitate insoluble in excess alkali was formed. X contained
A. lead (II) ions.
B. magnesium ions.
C. zinc ions.
D. aluminium ions.

38. Which one of the **underlined** substances in the equation below is being reduced?

A. $CuO_{(s)} + \underline{H_{2\,(g)}} \rightarrow Cu_{(s)} + H_2O_{(l)}$

B. $2\underline{Fe^{2+}}_{(aq)} + Cl_{2\,(g)} \rightarrow 2Fe^{3+}_{(aq)} + 2Cl^-_{(aq)}$

C. $MnO_{2\,(s)} + \underline{4HCl}_{(aq)} \rightarrow MnCl_{2(aq)} + 2H_2O_{(l)} + Cl_{2(g)}$

D. $\underline{H_2SO_4}_{(l)} + C_{(s)} \rightarrow CO_{2(g)} + 2SO_{2(g)} + 2H_2O_{(l)}$

39. The process which does **not** require a catalyst is the manufacture of
A. nitric acid.
B. ammonia.
C. sodium hydroxide.
D. Sulphuric acid.

40. Which one of the following is observed when copper (III) sulphate is electrolysed using copper electrodes?
A. Bubbles of hydrogen gas.
B. The cathode decreases in size.
C. The anode decreases in size.
D. The anode is coated with copper.

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a correct statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	False	Correct.

41.

When pure copper is heated in air, its mass increases	**because**	the metal is high in the activity series.	

42.

Concentrated Sulphuric acid is used as a drying agent	**because**	Sulphuric acid has a high affinity for water.	

43.

Potassium with atomic number 19 belongs to Group I in the Periodic Table	**because**	Potassium gains one electron to form potassium ion.	

44.

Ethene can form a polymer	**because**	it is a hydrocarbon.	

45.

Electrolysis of dilute Sulphuric acid between platinum electrodes produces oxygen at the anode	**because**	the hydroxide ions are preferentially discharged at the anode.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*
A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct.
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Which one of the following statements is **true** about the kinetic theory of gases?
1. Gas molecules consist of tiny particles.
2. Gas particles collide with one another.
3. Gas particles are in a state of continuous motion.
4. There are large forces of attraction between gas particles.

47. Which one(s) of the following oxides dissolve(s) in both aqueous sodium hydroxide and dilute nitric acid?
1. Magnesium oxide.
2. Aluminium oxide.
3. Copper (II) oxide.
4. Lead (II) oxide.

48. Which pair(s) of mixtures below can be separated by sublimation?
1. Sodium chloride and lead(II) chloride.
2. Copper (II) chloride and zinc nitrate.
3. Zinc sulphate and lead (II) nitrate.

4. Ammonium chloride and zinc chloride.

49. The hydroxide(s) which is/are soluble in excess ammonia solution is/are
1. lead (II) hydroxide.
2. zinc hydroxide.
3. aluminium hydroxide.
4. copper (II) hydroxide.

50. The observation(s) made when a burning magnesium is plunged into a jar of carbon dioxide is/are
1. bright light.
2. white ash.
3. black solid.
4. colourless gas.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2005 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
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*Attempt **all** questions.*
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*Do **not** use pencil.*

1. The formula of the chloride of metal M is MCl_3. The formula of the sulphate of M is
A. MSO_4.
B. M_2SO_4.
C. $M_2(SO_4)_3$.
D. $M_3(SO_4)_2$.

2. Which one of the following formulae represents an alkane?
A. C_2H_4.
B. C_3H_4.
C. C_4H_8.
D. C_4H_{10}.

3. Which one of the following compounds is formed when excess sulphurdioxide is passed through sodium hydroxide solution?
A. Sodium sulphate.
B. Sodium hydrogen sulphite.
C. Sodium sulphite.
D. Sodium hydrogen sulphate.

4. Which one of the following substances is formed when magnesium burns in carbondioxide?
A. Magnesium carbonate.
B. Magnesium nitride.
C. Carbon monoxide.
D. Carbon.

5. Calcium carbonate reacts with hydrochloric acid according to the following equation:
$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$.
The mass in grammes of carbondioxide formed when 20 g of calcium carbonate is completely reacted with hydrochloric acid is
[Ca=40; C=12; O=16]
A. 20x44x100
B. $\frac{44x100}{20}$
C. $\frac{20x100}{44}$
D. $\frac{20x44}{100}$

6. Which one of the following substances will dissolve in water to give a solution that would turn red litmus paper blue?

A. Sodium chloride.
B. Sodium hydroxide.

C. Sodium sulphate.
D. Sodium nitrate.

7. Which one of the following oxides will form a metal when heated with aluminium?
A. $K_2O_{(s)}$.
B. $MgO_{(s)}$.
C. $Na_2O_{(s)}$.
D. $PbO_{(s)}$.

8. The rate of decomposition of hydrogen peroxide would be increased by the addition of
A. copper (II) sulphate.
B. manganese (IV) oxide.
C. vanadium (V) oxide.
D. finely divided iron.

9. Which one of the following liquids is miscible with water?
A. Ethanol.
B. Methyl benzene.
C. Kerosene.
D. Petrol.

10. The substance that will undergo a permanent change when heated strongly is
A. I_2.
B. $CuCO_3$.
C. NH_4Cl.
D. Na_2CO_3.

11. The substance that is produced at the anode when a concentrated solution of potassium iodide is electrolysed is
A. potassium.
B. hydrogen.
C. oxygen.
D. iodine.

12. Butane burns in excess air according to the following equation:
$2C_4H_{10(g)} + 13O_{2(g)} \rightarrow 8CO_{2(g)} + 10H_2O \quad \Delta H=-5760$ kJ.
The quantity of heat evolved when 1.6 dm^3 of butane is burnt at room temperature is
[1 mole of gas occupies 24 dm^3 at room temperature]
A. $\frac{5760x116}{2x24}$
B. $\frac{5760x1.6}{2x24}$
C. $\frac{5760x1.6}{24}$
D. $\frac{5760x116}{24}$

13. Lead (II) nitrate reacts with potassium iodide according to the following equation:
$Pb(NO_3)_{2(aq)} + 2Kl_{(aq)} \rightarrow PbI_{2(s)} + 2KNO_{3(aq)}$.
The mass of lead (II) iodide formed when 33.2 g of potassium iodide is heated in excess lead (II) nitrate is
[K=39; I=127; Pb=207]

A. 16.9 g.
B. 46.1 g.
C. 66.4 g.
D. 92.2 g.

14. Which one of the following nitrates will produce nitrogen dioxide when strongly heated?
A. Potassium nitrate.
B. Sodium nitrate.
C. Zinc nitrate.
D. Ammonium nitrate.

15. Which of the following salts **cannot** be prepared by precipitation method?
A. Lead (II) nitrate.
B. Lead (II) chloride.
C. Lead (II) sulphate.
D. Lead (II) carbonate.

16. Which one of the following reagents can be used to distinguish between $Zn^{2+}_{(aq)}$ and $Al^{3+}_{(aq)}$?
A. Lead (II) nitrate.
B. Sodium hydroxide.
C. Potassium iodine.
D. Ammonia.

17. The substance which is **most** suitable for drying ammonia is
A. concentrated sulphuric acid.
B. calcium chloride.
C. phosphorus (V) oxide.
D. calcium oxide.

18. The reaction between ethanol and concentrated sulphuric acid to form ethene is called
A. hydrogenation.
B. catalysis.
C. dehydration.
D. hydration.

19. Calcium hydrogen carbonate when heated decomposes according to the equation:
$Ca(HCO_3)_{2(s)} \rightarrow CaO_{(s)} + H_2O_{(l)} + 2CO_{2(g)}$.
The volume of carbondioxide evolved at s.t.p. when 27 g of hydrogen carbonate is heated is

[H=1; C=12; O=16; Ca=40; 1 mole of gas occupies 22.4 dm^3]

A. 27 x 22.4 l
B. $\frac{162}{27x22.4}$ l
C. $\frac{2x27x22.4}{162}$ l
D. $\frac{162}{2x27x22.4}$ l

20. Which one of the following salts can be prepared by precipitation method?
A. Zinc nitrate.
B. Copper (II) sulphate.
C. Barium sulphate.
D. Iron (III) chloride.

21. Copper reacts with oxygen aqueous to the equation below:
$2Cu_{(s)} + O_{2(g)} \xrightarrow{heat} 2CuO_{(s)}$.
Calculate the mass of copper (II) oxide formed when 0.64 g of copper powder is completely reacted with oxygen.

[Cu=64; O=16]
A. $\frac{0.64x80}{96}$
B. $\frac{0.64x64}{80}$
C. $\frac{0.64x96}{80}$
D. $\frac{0.64x80}{64}$

22. Which one of the following metals can displace hydrogen from dilute hydrochloric acid?
A. Copper.

B. Magnesium.
C. Lead.
D. Silver.

23. The following acids are completely ionised in water **except**
A. hydrochloric acid.
B. nitric acid.
C. sulphuric acid.
D. carbonic acid.

24. Which one of the following statements **false** about catalysts? They
A. increase the amount of products in chemical reactions.
B. remain chemically the same at the end of chemical reactions.
C. increase the rates of chemical reactions.
D. affect the rates of reactions even in very small amounts.

25. The gas that turns brown when exposed in air from the following list is
A. sulphur dioxide.
B. hydrogen chloride.
C. hydrogen sulphide.
D. nitrogen monoxide.

26. The concentration, in grammes per litre, of a 0.05 M sodium carbonate solutuion is
[N=23; O=16; C=12]
A. 0.05x83
B. 0.05x106
C. $\frac{106}{0.05}$
D. $\frac{83}{0.05}$

27. Which **one** of the following equations represents an oxidation – reduction reaction?

A. $H^{+}_{(aq)} + OH^{-}_{(aq)} \rightarrow H_2O_{(l)}$.
B. $Pb^{2+}_{(aq)} + SO^{2-}_{4\ (aq)} \rightarrow PbSO_{4(s)}$.
C. $Cu^{2+}_{(aq)} + Fe_{(s)} \rightarrow Cu_{(s)} + Fe^{2+}_{(aq)}$.
D. $Ca^{2+}_{(aq)} + CO^{2-}_{3\ (aq)} \rightarrow CaCO_{3(s)}$.

28. Which one of the following is an acid salt?
A. $CaSO_4$.
B. NH_4Cl.
C. KNO_3.
D. $NaHCO_3$.

29. The hydroxide that dissolves in excess aqueous ammonia but does **not** in sodium hydroxide solution is
A. Lead (II) hydroxide.
B. Zinc hydroxide.
C. Aluminium hydroxide.
D. Copper (II) hydroxide.

30. The oxide that dissolves **most readily** in water is
A. sodium oxide.
B. calcium oxide.
C. lead (II) oxide.
D. copper (II) oxide.

31. The catalyst used during the manufacture of nitric acid by oxidation of ammonia is
A. platinum.

B. iron.
C. nickel.
D. copper.

32. Copper (II) oxide reacts with hydrogen according to the equation:
$CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{(l)}$.
The mass of copper formed when 8.0 g of the oxide is reacted with excess hydrogen is
[Cu=63.5; H=1; O=16]
A. 63.5 x 80 x 8 g
B. $\frac{63.5x80}{8}$ g
C. $\frac{8.0x80}{63.5}$ g
D. $\frac{63.5x8.0}{80}$ g

33. Which of the following pairs of metals is used to make solder?
A. Zinc and lead.
B. Copper and aluminium.
C. Tin and lead.
D. Copper and zinc.

34. The substance that decomposes when heated strongly is
A. potassium carbonate.
B. potassium hydroxide.
C. potassium chloride.
D. potassium nitrate.

35. The cation that forms a green precipitate with sodium hydroxide is

A. $Cu^{2+}_{(aq)}$.
B. $Fe^{2+}_{(aq)}$.
C. $Al^{3+}_{(aq)}$.
D. $Fe^{3+}_{(aq)}$.

36. 10 g of methanol, CH_3OH, burns in air to liberate 226 kJ of heat. The amount of heat liberated when 1 mole of methanol is burnt in air is
[H=1; C=12]
A. $\frac{32x226}{10}$
B. $\frac{10x32}{226}$
C. $\frac{10}{32x226}$
D. $\frac{10x226}{32}$

37. Methane burns in oxygen according to the equation:

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$.

The volume of methane that remains un-burnt when $50cm^3$ of methane is reacted with $40cm^3$ of oxygen is

A. 10 cm^3.
B. 20 cm^3.
C. 30 cm^3.
D. 45 cm^3.

38. Which one of the following fertilizers has the highest nitrogen content per mole of the fertilizer?
[H=1; C=12; N=14; O=16; S=32; Cl=35.5]
A. $CO(NH_2)_2$.
B. $(NH_4)_2SO_4$.

C. NH_4Cl.
D. NH_3NO_3.

39. The hydroxide which turns brown when exposed to air from the list below is
A. copper (II) hydroxide.
B. iron (II) hydroxide.
C. lead (II) hydroxide.
D. iron (III) hydroxide.

40. The mass of 4 atoms of phosphorus is
[Avogadro's constant=6.02 x 10^{23}; P=31]

A. $\frac{6.02x10^{23}}{4x31}$

B. $\frac{31x4}{6.02x10^{23}}$

C. $\frac{31x6.02x10^{23}}{4}$

D. $\frac{31}{4x6.02x10^{23}}$

*Each of the questions **41** to **45** consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:

*A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.*
*B. if both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.*
*C. if the assertion is **true** but the reason is **not** a correct statement.*
*D. if the assertion is **not** correct but the reason is a **true** statement.*

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (reason is a correct explanation.)
B.	True	True (Reason is **not** a correct explanation.)
C.	True	Incorrect.
D.	Incorrect	Correct.

41.

Hydrogen chloride conducts electricity	**because**	hydrogen chloride is soluble in water.	

42.

Ammonia reacts with copper (II) oxide to form nitrogen	**because**	copper (II) oxide is oxidised by ammonia.	

43.

During the manufacture of sulphuric acid, sulphur dioxide is converted to sulphur trioxide in the presence of vanadium (V) oxide	**because**	vanadium (V) oxide increases the rate of formation sulphur trioxide.	

44.

Sulphur dioxide turns acidified potassium dichromate green	**because**	it is a reducing agent.	

45.

Pollen grains in water are in continuous motion	**because**	pollen grains collide with moving water molecules.	

*In each of the questions **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct.
C. If 2 and 4 only are correct.
If 4 only is correct.

46. A metal forms a hydroxide which is soluble in water. The metal will form a chloride that
1. is soluble in water.
2. has a high melting point.
3. conducts electricity when molten.
4. is soluble in methylbenzene.

47. Which one of the following is/are observed when a mixture of copper (II) oxide and charcoal is heated?
1. Limewater remained colourless.
2. Limewater turned milky.
3. Black residue.
4. Reddish-brown residue.

48. Which of the following substance(s) is/are commonly used to convert brown sugar to white sugar?
1. Sodium dioxide.
2. Bleaching powder.
3. Animal charcoal.
4. Sodium hypochlorite.

49. Which one of the following when electrolysed between platinum electrodes will produce water and hydrogen?
1. Acidified water.
2. Sodium chloride solution.
3. Copper (II) chloride solution.
4. Copper (II) sulphate solution.

50. Which of the following nitrates will decompose on heating to form a nitrite?
1. Calcium nitrate.
2. Potassium nitrate.
3. Magnesium nitrate.
4. Sodium nitrate.

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2006 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

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Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*Electronic calculators must **not** be used.*
*You are required to write the correct answer **A, B, C,** or **D** against each question in the box on the right-hand side of each page.*

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1. Chlorine can be prepared in the lab by heating conc. Hydrochloric acid with
A. Lead (II) oxide
B. Iron (II) oxide
C. Copper (II) oxide
D. Manganese (IV) oxide

2. The most efficient method for separating a mixture of copper (II) sulphate and lead (II) sulphate is by
A Decantation
B. Sublimation
C. Filtration
D. Crystallisation

3. Which one of the following salts can be prepared from its elements by direct synthesis.
A. Potassium sulphate
B. Copper (11) sulphate
C. Magnesium chloride
D. Lead (11) nitrate

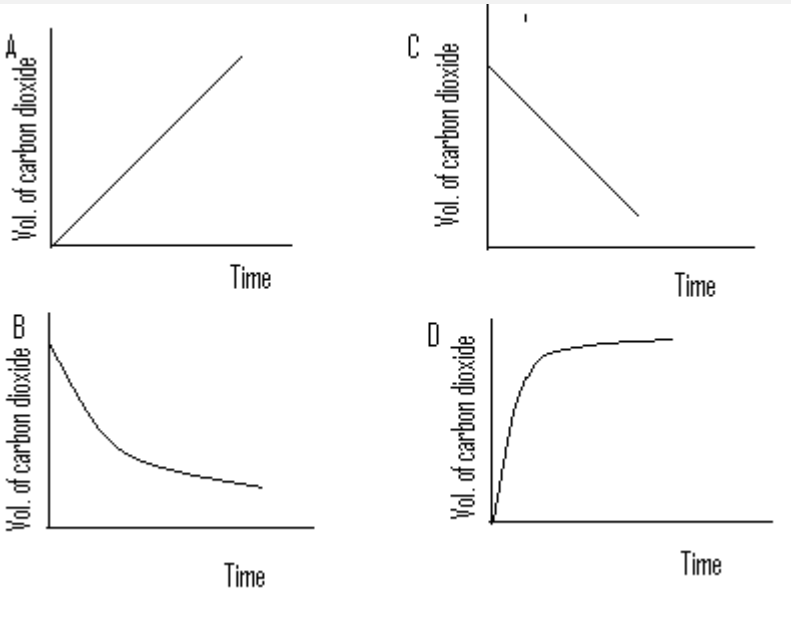
4. When 1.0g of carbon is burnt in excess oxygen, the heat produced raises the temperature of 400g of water by 19^0C. the heat of combustion of carbon is (C = 12, Specific capacity of water = 4.2 KJ Kg $^{-1}$ K^{-1}).
A. 0.4 x 4.2 x 19 x 12 KJ mol^{-1}
B. 400 x 4.2 x 19 x 12 KJ mol^{-1}
C. $\frac{0.4 \times 4.2}{12 \times 19}$
D. $\frac{12 \times 19}{0.4 \times 4.2}$

5. The trend which is observed on moving from left to right across a periodic table is that the
A. Non metallic character increases
B. Metallic character increases
C. Number of energy levels decreases
D. Number of energy levels increases

6. Which one of the following gases will not reduce copper (II) oxide
A. Ammonia
B. Carbon dioxide

C. Hydrogen
D. Chlorine

7. Which one of the following graphs shows the variation of the volume of the carbon dioxide evolved with time when calcium carbonate is reacted with dilute hydrochloride?



8. Aluminium reacts with hydrochloric acid according to the following equation.
$2Al(s) + 6HCl(aq) \rightarrow 3H_2(g) + 2AlCl_3(aq)$. The volume of hydrogen formed when 5g of Aluminium reacted with excess acid is,

A. $\frac{5 \times 3 \times 22400}{1}$ B. $\frac{5 \times 22400}{2 \times 27}$ c, $\frac{27 \times 3 \times 22400}{3 \times 2 \times 27}$ D. $\frac{5 \times 2 \times 22400}{2 \times 5}$ $\frac{}{3 \times 27}$

9. The metal which can be extracted form its ore only by electrolysis is,
A. Zinc B. Copper C. iron D. Magnesium.

10. Which of the following hydroxides will react with both dilute hydrochloric acid and aqueous sodium hydroxide?
A. $Fe(OH)_3$ B. $Al(OH)_3$ C. $Cu(OH)_2$. D. $Mg(OH)_2$.

11. Which of the following methods is more suitable for preparing a pure dry sample of silver nitrate?
A. Direct synthesis. B. Neutralisation. C. Precitation. D. Reacting silver with an acid.

12. When heated strongly, lead (II) nitrate leaves a solid residue whose colour is
A. reddish brown (hot), grey (cold).
B. yellow (hot), white cold.
C. reddish brown (hot), yellow (cold)
D. reddish brown (hot), white (cold)

13. The percentage of water of crystallisation in iron (11) sulphate, $FeSO_4.7H_2O$ is
($FeSO_4$ = 156, O = 16, H =1)
A. $\frac{126 \times 100}{278}$

B. $\frac{278 \times 100}{126}$
C. $\frac{126 \times 100}{}$

D. $\frac{152}{126} \times 100$

14. The atomic number of elements X and Y are 9 and 11 respectively. Which one of the following properties is shown by the compound formed when X combines with Y?
A. It is a non conductor of electricity.
B. It has a high melting point.
C. It is insoluble in water.
D. It is a gas at room temperature.

15. Which one of the following gases does not react with water?
A. Carbon dioxide
B. Oxygen
C. Ammonia
D. Hydrogen chloride

16. The gas that changes the colour of acidified potassium dichromate solution orange to green is.
A. ammonia
B. Chlorine
C. carbon dioxide
D. sulphur dioxide

17. Which one of the following solution contains the highest concentration of hydrogen ions?
A. Half a litre of $1MSO_4$
B. Two litres of 1M HCL.
C. One and half litres of 1M H_2SO_4
D. One litre of 1M HCL.

18. Which one of the following substances forms an oxide which when dissolved in water turns red litmus blue.
A. Carbon.
B. Phosphorous.
C. Sulphur.
D. Sodium.

19. Copper (11) sulphate reacts with sodium carbonate according to the following equations: $CuSO_{4\,(aq)} + Na_2CO_{3\,(aq)} \longrightarrow CuCO_{3(S)} + Na_2SO_{4\,(aq)}$
The mass of copper (11) carbonate that is formed when 200 cm^3 of a solution containing 5.3g of sodium carbonate per litre of solution was reacted completely with copper (11) sulphate is given by

(C = 12, O = 16, Na = 23, S = 32, Cu = 64)

A. $\frac{5.3 \times 200 \times 124}{160 \times 1000}$
B. $\frac{5.3 \times 124 \times 1000}{106 \times 200}$
C. $\frac{106 \times 200 \times 124}{5.3 \times 1000}$
D. $\frac{106 \times 124 \times 1000}{5.3 \times 200}$

20 The process of making iron from steel is called?
A. galvanisation

B. metal plating
C. glazing
D. alloying

21. Which one of the following properties is not shown by carbon monoxide?
A. It pollutes the atmosphere.
B. It is insoluble in water.
C. It is a reducing reagent
D. It is an acidic oxide

22. The substance that will not sublime when heated is
A. sulphur
B. ammonium chloride
C. iron (III) chloride
D. iodine

23. The cation when reacted with aqueous sodium hydroxide will form a precipitate that is soluble in excess sodium hydroxide solution is
A. $Fe^{3+}_{(aq)}$
B. $Al^{3+}_{(aq)}$
C. $Cu^{2+}_{(aq)}$
D. $Fe^{2+}_{(aq)}$

24. 200.0 cm^3 of a 0.1 M sodium hydroxide solution was diluted with water to make two litres of solution. The concentration of the dilute solution is
A. 0.002 M
B. 0.050 M
C. 0.020 M
D. 0.010 M

25. A white solid, X, was kept in an open container. After some days, the solid became liquid. X is
A. Calcium oxide.
B. magnesium hydroxide
C. fused calcium chloride
D. sodium carbonate crystals

26. Which one of the following hydrocarbons does not belong to the same group?
A. Ethane
B. Ethene
C. Methane
D. Propane

27. Copper (II) sulphate reacts with iron according to the following equation:

$$Cu^{2+}(aq) + Fe(s) \longrightarrow Cu(s) + Fe^{2+}$$

The mass of a dry copper metal that can be obtained when excess iron fillings is added to 250 cm^3 of a 0.5 M copper (II) sulphate solution is
(Cu = 64, Fe = 56)
A.0.125g
B. 7.000g
C. 8.000g
D. 16.000g

28. Which one of the following processes increases the concentration of oxygen in the atmosphere?
A. Photosynthesis
B. Fermentation

C. Combustion.
D. Decaying of organic matter

29. Which one of the following polymers can be remoulded?
A. Polyester
B. Nylon
C. Polythene.
D. Rubber

30. 15 cm^3 of a dibasic acid was neutralization by 30 cm^3 of a 0.4 M potassium hydroxide solution. The morality of the acid is?

A. $\frac{2 \times 15}{0.4 \times 30}$ M

B. $\frac{0.4 \times 30}{2 \times 15}$ M

C. $\frac{15 \times 0.4}{30 \times 2}$ M

D. $\frac{2 \times 0.4 \times 30}{15}$ M

31. Which one of the following acids when treated with zinc will not produce hydrogen gas?
A. Dilute nitric acid
B. Dilute hydrochloric acid
C. Dilute sulphuric acid
D. Dilute carbonic acid

32 The compound which does not form an electrolyte when dissolved in water is
A. Potassium chloride
B. Hydrogen chloride
C. Ethanol
D. Ethanoic acid

33. The number of electrons, neutrons and electrons in some particles are shown the table below:

Particle	**protons**	**Neutrons**	**Electrons**
P	**1**	**1**	**2**
B	**2**	**2**	**2**
Q	**3**	**4**	**2**
T	**4**	**5**	**4**

Which one of the following particles represents a cat ion?
A. T
B. R
C. Q
D. P

34. Which one of the following factors does **not** affect the selection of an ion that is discharged at the electrodes during electrolysis?
A. Reactivity of the metal
B. Nature of electrodes
C. surface area of the electrode
D. Concentration of the electrolyte

35. An oxide of a metal, M, contains 86.6%M. The empirical formula of the oxide is
(O = 16, M = 207)

A. MO
B. M_2O
C. MO_2
D. M_2O_3

36. The substance which does not produce carbon dioxide when heated strongly is
A. Calcium carbonate
B. Sodium carbonate
C. Potassium hydrogen carbonate
D. sodium hydrogen carbonate

37. Which one of the following substances is not used in the softening of water?
A. Chlorine
B. permitit
C. Sodium carbonate
D. Calcium carbonate

38. The gas that will diffuse at the same rate as dinitrogen oxide, N_2O , is
(H = 1, O = 16, C = 12, N = 14, S = 32, Cl = 35.5)
A. SO_2 B. CO_2 C. HCL D. NH_3

39. Which one of the following is not a property of ethene?
A. It turns potassium permanganate colourless
B. It is an un saturated hydrocarbon
C. It decolourises bromine water
D. It is a saturated hydrocarbon

40. Metal P displaces hydrogen from a dilute acid but metal Q does not. Metal R displaces Polluted from its chloride. The order of reactivity of the metals beginning with the most reactive is
A. P, Q, R
B. Q, P, R
C. R, Q, P
D. R, P, Q

Each of the questions 41 to 45 consists of an assertion (statement) on the left hand side and the reason on the right hand side.
Select:

A. if both the assertion and the reason are true statement and the reason is a correct explanation of the assertion
B. If both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion.
C. If the assertion is true but the reason is not a correct statement.
D. If the assertion is not correct but the reason is a correct statement

INSTRUCTIONS SUMMARISED:

Assertion	**Reason**
A. true	True (Reason is a correct explanation)
B. true	True (Reason is not a correct explanation)
C. true	Incorrect.
D. incorrect	correct

41. Nitric acid can be produced by Reacting any nitrate with sulphuric Acid.	**because**	Sulphuric aid is a stronger acid than nitric acid.
42. Excessive use of detergents for Laundry could cause environmental Concerns	**because**	all detergents are insoluble in water.
43. The enthalpy of combustion of butane Is higher than that of ethane	**because**	butane contains more carbon atoms than ethane.
44. Sulphuric acid changes sugar from White to black	**because**	Sulphuric acid is a oxidizing agent
45. Alkali metals are highly Electropositive	**because**	they have one electron in their outer most shell.

In each of the question 46 to50, one or more of the answers given may be correct.
Read each question carefully and then indicate the correct answer according to the following:

A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Carbon is similar to sulphur in that both
1. Are non metallic solids.
2. Exist in allotropic forms.
3. Form covalent compounds.
4. Form neutral oxides.

47. Which of the following gases is /are used as coolant (s) in refrigerators?
1. Chlorine
2. Carbon dioxide
3. Sulphur dioxide
4. Ammonia

48. Which of the following properties of metals is /are a result of it's / their Having free delocalised electrons?
1. Electrical conduction
2. Ductility
3. Heat conduction
4. Malleability

49. Nitrogen can react with hydrogen to produce ammonia according to the following equation:

$$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g);\ \Delta = -92.0\ kJ\ mol^{-1}$$

The condition(s) that would favour the formation of ammonia is/are.
1. low pressure
2. High pressure
3. High Temperature
4. Low temperature

50. The electronic configurations of elements B, D, E and F are 2:4, 2:6, 2:8:3 and 2:8:7 respectively. Which elements when reacted together will form covalent compound(s)?

1. B and D
2. D and E
3. B and F
4. E and F

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*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each question.*
*Do **not** use pencil.*

1. Which one of the following substances does **not** change its mass when heated?
   A. Sodium chloride
   B. Copper turnings
   C. Manganese ribbon
   D. Potassium chlorate

2. Which one of the following catalyst is most suitable for use during the manufacture of sulphuric acid by the contact process?
   A. Manganese (IV) oxide
   B. Reduced iron
   C. Platinised asbestos
   D. Vanadium (V) oxide

3. The full symbol of an atom of an element X is $^{40}_{20}X$. The charge on an ion of X is
   A. 2+
   B. 1+
   C. 1-
   D. 2-

4. Which one of the following salts will not form a precipitate with lead (II) ions?
   A. Sodium carbonate
   B. Calcium nitrate
   C. Ammonium chloride
   D. Potassium sulphate

5. Which one of the following molecular formulae is that of an alkene?
   A. C_4H_6
   B. C_3H_6
   C. C_3H_8
   D. C_2H_2

6. Hydrogen chloride reacts with ammonia according to the following equation:
   $NH_3\ (g) + HCl\ (g) \longrightarrow NH_4Cl(s)$. The mass of ammonium chloride formed when excess ammonia is reacted with 0.56 dm^3 of hydrogen chloride at s.t.p is
   [One mole of a gas occupies 22.4 dm^3 at s.t.p; N = 14, H = 1, Cl = 35.5]
   A. $\frac{0.56\ x\ 22.4}{53.5}\ g$

B. $\frac{53.5 \; x \; 0.56}{22.4} g$

C. $\frac{0.56 \; x \; 22.4}{50.5} g$

D. $\frac{0.56 \; x \; 50.5}{22.4} g$

7. Which one of the following salts will dissolve in water to form a basic solution?
   A. NH_4Cl.
   B. $KHSO_4$.
   C. $(NH_4)_2 SO_4$.
   D. $Na_2 CO_3$.

8. Which one of the following nitrates will decompose to give a metal when strongly heated?
   A. Silver nitrate
   B. Calcium nitrate
   C. Zinc nitrate
   D. Sodium nitrate

9. Copper (II) oxide reacts with hydrogen according to the following reaction:
   $CuO(s) + H_2(g) \longrightarrow$heat $Cu(s) + H_2O(g)$. The volume of hydrogen in litres, required to react completely with 16.0 g of copper (II) oxide at s.t.p is
   [One mole of a gas occupies 22.4 l at s.t.p; Cu = 64, O = 16]
   A. 1.12
   B. 2.24
   C. 4.48
   D. 11.20

10. Which one of the following will displace zinc from its salt in solution?
    A. Iron
    B. Copper
    C. Lead
    D. Calcium

11. Which one of the following anions will react with lead (II) nitrate solution to form a yellow precipitate?
    A. $Cl^-(aq)$
    B. $I^-(aq)$
    C. $CO_3^{2-}(aq)$
    D. $SO_4^{2-}(aq)$

12. The electronic configuration of the atom of an element X is 2:8:6. The number of electrons in the ion commonly formed by X is
    A. 14
    B. 15
    C. 17
    D. 18

13. Which one of the following mixtures can be separated by fractional crystallisation?
    A. Ammonium chloride and Lead (II) chloride

B. Iron and Sulphur
C. Potassium nitrate and Sodium nitrate
D. Sugar and Sand

14. Which one of the following acids when reacted with a given mass of copper (II) carbonate will liberate the least amount of carbon dioxide?
A. 1 M sulphuric acid
B. 2 M nitric acid
C. 2 M Ethanoic acid
D. 2 M Hydrochloric acid

15. Which one of the following substances is manufactured by electrolysis?
A. Sodium sulphate
B. Sodium carbonate
C. Sodium hydroxide
D. Sodium nitrate

16. Elements W, X, Y and Z and their oxides react as follows:
Z displaces X and W from their oxides;
W displaces X from its oxide and
Y displaces Z from its oxide.
The order of reactivity of the metal is
A. X > W > Y
B. Y > Z > W > X
C. W > X > Y > Z
D. Y > Z > X > W

17. A hydro carbon contains 4 g of carbon and 0.8 g of hydrogen. The empirical formula of the hydrocarbon is (C = 12; H = 1)
A. C_2H
B. CH_4
C. CH_2
D. C_6H

18. Steel is an alloy of iron and
A. zinc
B. carbon
C. tin
D. sulphur

19. During the manufacture of sulphuric acid, sulphur trioxide is dissolved in
A. cold water
B. hot water
C. dilute sulphuric acid
D. concentrated sulphuric acid

20. 2g of magnesium was reacted with 100 cm^3 of hydrochloric acid under various conditions. Under which one of the following conditions would the rate of reaction be fastest?
A. Magnesium powder and 0.5 M HCl at 20ºC
B. Magnesium ribbon and 2 M HCl at 30ºC
C. Magnesium ribbon and 0.5 M HCl at 20ºC
D. Magnesium powder and 2 M HCl at 30ºC

21. Which one of the following metals can reduce iron (III) ion in solution to iron (II) ion?

A. Copper
B. Lead
C. Zinc
D. Silver

22. Hydrogen burns in oxygen to form steam according to the following equation:

$2H_2\ (g) + O_2\ (g) \longrightarrow 2\ H_2O\ (g)$.

The mass of steam formed when 100 cm^3 of hydrogen is burnt in excess oxygen at s.t.p is
[H = 1, O = 16 One mole of a gas occupies 22,400 cm^3 at s.t.p]
A. 0.04 g
B. 0.08 g
C. 0.12 g
D. 0.16 g

23. Ethanol burns in oxygen according to the following reaction:

$CH_3CH_2OH\ (l) + 3O_2\ (g) \longrightarrow 2CO_2\ (g) + 3H_2O\ (g)$.

Calculate the amount of heat evolved when 45 g of oxygen is used for complete combustion of ethanol.
[C = 12, H = 1 O = 16The molar heat of combustion of ethanol = 1370.0 kJ mol^{-1}]
A. 642.2 kJ
B. 1284.4 kJ
C. 1340.2 kJ
D. 1926.6 kJ

24. Which one of the following is **not** a property of carbon monoxide?
A. is insoluble in water
B. reduces copper (II) oxide to copper
C. burns in air
D. turns lime water milky

25. Which of the following substances reacts with ammonium sulphate to form a white precipitate?
A. Silver nitrate
B. Sodium hydroxide
C. Hydrochloric acid
D. Barium chloride

26. 10 cm^3 of sulphuric acid reacted completely with 25 cm^3 of 0.1 M sodium hydroxide solution. The molarity of the sulphuric acid is
A. 0.125 M
B. 0.250 M
C. 0.500 M
D. 1.000 M

27. The atomic number of elements W, X, Y and Z are 8, 11, 12 and 16 respectively. Which one of the following pairs of elements will form a covalent compound?
A. W and Y
B. W and X
C. W and Z
D. Z and X

28. Which one of the following would be observed if aqueous sulphur dioxide was added to a solution containing iron (III) ions? The solution would turn from
A. brown to green
B. brown to yellow
C. green to brown
D. yellow to brown

29. Sodium carbonate reacts with hydrochloric acid according to the following equation:

$Na_2CO_3\ (aq) + 2HCl\ (aq) \rightarrow 2NaCl\ (aq) + CO_2\ (g) + H_2O\ (l)$

The volume of 0.2 M hydrochloric acid required to react completely with 20 cm3 of 0.1 M sodium carbonate solution is

A. $\left[\frac{2 \times 20 \times 0.1}{0.2}\right]$ cm^3

B. $\left[\frac{2 \times 20 \times 0.2}{0.1}\right]$ cm^3

C. $\left[\frac{20 \times 0.2}{2 \times 0.1}\right]$ cm^3

D. $\left[\frac{20 \times 0.1}{2 \times 0.2}\right]$ cm^3

30. Solid W dissolves in concentrated sulphuric acid with effervescence of a colourless gas that fumes in moist air. The anion in W is likely to be a
A. nitrate
B. chloride
C. sulphate
D. carbonate

31. Which one of the following substances is formed when excess concentrated sulphuric acid is heated with ethanol?
A. Hydrogen
B. Ethane
C. Water
D. Ethene

32. Which one of the following is observed when excess aqueous ammonia is added to aqueous copper (II) ions?
A. A green precipitate
B. Deep blue solution
C. A green solution
D. Reddish brown precipitate

33. The atomic number of an element T, is 10. T shows similar properties to the element with atomic number
A. 14
B. 16
C. 18
D. 20

34. When one mole of ammonium chloride was dissolved in a certain volume of water, 2.94 kJ of heat was absorbed. The amount of heat absorbed when 5035 g of ammonium chloride is dissolved in the same volume of water is

A. $\left[\frac{53.5}{2.94 \times 5.35}\right]$ kJ

B. $\left[\frac{2.94 \times 5.35}{5.35}\right]$ kJ

C. $\left[\frac{29.4 \times 53.5}{5.35}\right]$ kJ

D. $\left[\frac{53.5 \times 5.35}{2.94}\right]$ kJ

35. The electronic configuration of elements *W*, *X*, *Y* and *Z* are 2:8:2, 2:8:3; 2:8:5 and 2:8:6 respectively. Which one of the following pairs of element s are non-metals?
A. Y and Z
B. Y and X
C. W and Y
D. W and X

36. Sulphur dioxide reacts with oxygen to form sulphur trioxide according to the following equation:
$2SO_2\ (g) + O_2\ (g) \longrightarrow 2SO_3\ (g)$. 20 cm^3 of sulphur dioxide was mixed with 25 cm^3 of oxygen at a certain temperature and pressure. The volume of oxygen that reacted was
A. 10.0 cm^3
B. 12.5 cm^3
C. 20.0 cm^3
D. 25.0 cm^3

37. Which one of the following substances when burnt in air does not produce water?
A. Wood
B. Charcoal
C. Paper
D. Ethane

38. When 2.5 g of a solid was heated, 250 cm3 of a gas was produced at s.t.p. and a residue of 1.4 g was left. The molecular mass of the gas is given by
A. $\frac{22400 \times 2.5}{560}$
B. $\frac{22400 \times 1.4}{560}$
C. $\frac{22400 \times 1.1}{560}$
D. $\frac{22400}{560 \times 2.5}$

39. The atom which is isotopic with the element whose full symbol is $^{30}_{15}Y$, is
A. $^{30}_{14}R$
B. $^{31}_{15}T$
C. $^{30}_{17}X$
D. $^{32}_{16}Z$

40. Lead (II) nitrate decomposes according to the following equation when heated strongly:
$2Pb(NO_3)_2\ (s) \longrightarrow^{heat} 2\ PbO\ (s) + 4\ NO_2\ (g) + O_2\ (g)$.
The mass of Lead (II) nitrate required to produce 15 dm3 of nitrogen dioxide at s.t.p is
[N = 14, O = 16, Pb = 207; One mole of a gas occupies 22.4 dm^3 at s.t.p]

A. $\left[\frac{331 \times 22.4}{2 \times 15}\right]$ g

B. $\left[\frac{2 \times 331 \times 22.4}{15}\right]$g

C. $\left[\frac{331 \times 15 \times 2}{22.4}\right]$g

D. $\left[\frac{331 \times 15}{2 \times 22.4}\right]$g

*Each of the questions **41** to **45** consists of an assertion (statement) on the left hand side and the reason on the right hand side.*

Select:

A. if both the assertion and the reason are **true** statement and the reason is a **correct** explanation of the assertion
B. If both the assertion and the reason are **true** statements but the reason is **not** a correct explanation of the assertion.
C. If the assertion is **true** but the reason is **not** a correct statement.
D. If the assertion is **not correct** but the reason is a **correct** statement

INSTRUCTIONS SUMMARISED:

Assertion	**Reason**
E. true	True (Reason is a correct explanation)
F. true	True (Reason is not a correct explanation)
G. true	Incorrect.
H. incorrect	correct

41.	During electrolysis of brine using Carbon electrodes, chlorine is liberated at the anode	**Because**	Chlorine ions is lower than hydroxide ion in the electro-chemical series.
42.	When a known volume of concentrated sulphuric acid is exposed to air for a few days, there will be an increase in the volume of sulphuric acid	**because**	Concentrated sulphuric acid is hygroscopic.
43.	The pH of a 2 M hydrochloric acid is equal to the pH of a 2 M sulphuric acid	**because**	Both hydrochloric acid and sulphuric acid are strong acids.
44.	When hydrogen peroxide is warmed with some manganese (IV) oxide more oxygen is produced than when the peroxide is warmed alone	**because**	Manganese (IV) oxide decomposes to give more oxygen.
45.	Zinc hydroxide is soluble in excess aqueous ammonia	**because**	Zinc hydroxide is amphoteric.

*In each of the equations from **46** to **50** one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following:*

A. If 1, 2 and 3 only are correct
B. If 1 and 3 only are correct
C. If 2 and 4 only are correct
D. If only 4 is correct

46. The electronic configuration of element T and Q are 2:6 and 2:8:5 respectively. The formula(e) of the compound(s) formed between T and Q is /are
1. Q_5T_2
2. Q_2T_3
3. Q_3T_2
4. Q_2T_5

47. Which of the following substances is / are formed when magnesium is reacted with steam?
1. Oxygen
2. Hydrogen
3. Magnesium
4. Magnesium oxide

48. Which of the following substances contain(s) the same number of atoms?
(C = 12; Ca = 40; Cu = 64; S = 32)
1. 16 g of copper
2. 12 g of carbon
3. 10 g of calcium
4. 16 g of sulphur

49. Which one of the following gases is / are produced by sewage?
1. Nitrogen
2. Ammonia
3. Ethene
4. Methane

50. Which of the following is / are formed when ammonia is passed over heated copper (II) oxide?
1. A brown solid
2. A reddish brown gas
3. A colour-less liquid
4. A black solid

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545/1 CHEMISTRY PAPER 1 Nov./Dec. 2008 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Instructions to candidates:
*This paper consists of **50** objective-type questions.*
*Attempt **all** questions.*
*You are required to write the correct answer **A, B, C,** or **D** in the box provided on the right-hand side of each question.*
*Do **not** use pencil.*

1. The substance that will dissolve in water with absorption of heat is
A. sulphuric acid.
B. ammonia.
C. hydrogen chloride.
D. potassium hydroxide.

2. During the manufacture of sulphuric acid by the Contact Process, sulphur dioxide combines with oxygen to form sulphur trioxide according to the following equation:
= -192kJmo
Which one of the following conditions would favour maximum yield of sulphur trioxide ?
A. Low temperature and low pressure.
B. High temperature and low pressure.
C. Low temperature and high pressure.
D. High temperature and high pressure.

3. A dilute solution of potassium bromide is electrolysed using carbon electrodes. The product at the positive electrode is
A. hydrogen.
B. bromine.
C. oxygen.
D. potassium.

4. Whei) 2.3 g of ethanol was completely burnt in oxygen, the heat evolved raised the temperature of l00g of water by 30 C. The molar heat of combustion of ethanol in joules is
[*The molar mass of ethanol = 46 and the specific heat capacity of water - 4.2Jg~[k~}].*
A. $\frac{100 \times 4.2 \times 30 \times 46}{2.3}$
B. $\frac{30 \times 4.2 \times 2.3 \times 100}{46}$
C. $\frac{20 \times 4.2 \times 2.3 \times 100}{46}$
D. 20 x 4.2 x 46 x 100

10. Hydrogen peroxide decomposes according to the following equation:
UhOi$_{(a}$<i)---------- 2/-I$_2$Q$_{(t)}$ ' 0$_{2(}$g)
Which one of the following graphs represents how the concentration of the reactant varies with time during the reaction ?

11.

12.

A.
B.
Time
Time
C.
o
C
o O
D.
Time
Time
Which one of the following will react with concentrated nitric acid to form a yellow solution ?
A. Cf
B. Fe
C. Br"
D. Cif
The atomic number of elements P, Q, R and T are 19, 17, 14 and 6 respectively. The pair of elements that can react to form an ionic compound is
A. B. C. D.
Q and T. R and Q. Q and P. R and T.

13. Which one of the following substances is an element ?
A. Ice B Sand. C Graphite. D Polyethene.

17.

14. The reaction in which cthenc forms a solid whose molecular mass is more than 10,000 is called
A. polymerization.
B. hydrogcnation.
C. vulcanization.
D. cracking.
v/
15. The substance that can react with water at room temperature is
A. [r] magnesium.
B. zinc.
C. iron.
D. calcium.

16. The salt that can be prepared by direct combination of elements is
A. $FeCl_3$
B. $CaSO_4$
C. $CuCO_3$
D. $Pb(NO_3)_2$

When 2.4 g of magnesium was reacted with 200 cm' of 2 M hydrochloric acid, 13.6 kJ of heat was evolved. The molar heat of reaction of magnesium with the acid is [*Mg = 24]*
A. 13.6 x 200
B.
24 x2.4
13.6 x 24 2.4 x200
kJ
C. 2.4 x 24
13.6
D. 24 x 13.6
2.4
kJ
kJ
kJ

18. The statement which is **not** true about sulphur dioxide is
A. it turns bine litmus red.
B. it is an oxidizing agent.
C. it is a reducing agent.
D. it decolourises potassium manganate (VH).

19. The compound which does **not** cause hardness of water is
A. calcium hydrogencarbonatc.
B. calcium sulphate.
C. sodium carbonate.
D. magnesium sulphate.

20. Which one of the following reagents can be used to distinguish between ethene and ethane ?
A. Bromine water.
B. Lime water.
C. Potassium dichromate.
D. Barium nitrate.

21. The gas that can diffuse at the same rate as oxygen at room temperature is
[// = 7, C = 72, *N= 14, O - 16, S = 32 ; one mole of a gas occupies 24.0dm at room temperature]*.
A. SO_2
B. NH_3
C. CO_2
D. NO

22. Which one of the following cations when treated with aqueous sodium hydroxide will give a precipitate that does **not** dissolve in excess alkali ?
A. Al "*" 2+ [1] B. Pb
2+
C. Zn
3+
D. Fe

23. The gas which when passed over strongly heated iron can oxidize the iron to iron(ll) only is
A. oxygen.
B. hydrogen chloride.
C. carbon monoxide.
D. chlorine.

24. The pigments of a green leaf can be separated by
A. distillation.
B. fractional distillation.
C. evaporation.
D. chromatography.

25. $20cm^3$ of 0.1 M sodium carbonate solution reacted completely with $10cm^3$ of dilute hydrochloric acid. The molarity of the acid is
A. 0.1 M
B. 0.2 M
C. 0.4 M
D. 0.8 M

28. Which one of the following is an alloy of lead ?
A. B. C. D.
Brass. Bronze. Duralumin. Solder.

27. Which one of the following substances can burn in air to form a compound with nitrogen ?
A. B. C. D.
Copper. Zinc. Iron. Magnesium.

28. The numbers of protons, neutrons and electrons in some particles are shown in the table below:

Particle	P	Q ' R	T
Protons	1	2 3 4	
Neutrons	1	2 4 5	
Electrons	2	2 2 4	

Which one of the following particles is an anion ?
A. B. C. D.
P.
Q. R. T.

\/

29. The carbonate which does **not** decompose when heated strongly is
A. zinc carbonate.
B. potassium carbonate.
C. calcium carbonate.
D. magnesium carbonate,

30. The gas that is normally collected by upward delivery is
A. ammonia.
B. [r] chlorine.
C. sulphur dioxide.
D. hydrogen chloride.

31. Ammonia reacts with copper (ll) oxide to form copper according to the following equation:
) - » 37/20(7)
The volume of ammonia that is required to react with 6.0g of copper(II) oxide at s.t.p. is
[H = 1 $_1$ Cv = 64, O = 16, N = 14; one mole of a gas occupies 22400 cm" at s.t.p. \
A 2 x 22400 x 6.0 i 3x80
B. 2 x 22400 x 6.0
cm" 80
C. 3 x 22400 x 6.0 $_3$
cm'
2 x 80
D. 3 x 22400 x 6.0 3
- cm" 80

32. The nitrate that decomposes when heated strongly to form a metal is
A. KNO_3
B. $Ca(NO_3)_2$
C. $Zn(NO_3)_2$
D. $AgNO_3$

33. The reaction of metals J, M and L with water under different conditions are described below:
J reacts with steam when the metal is strongly heated.
M reacts with water at room temperature.
L reacts with steam when the metal is red-hot.
The order of reactivity of the metals, starting with the least reactive is
A. M, J and L.
B. L, J and M.
C. M, L and J.
D. J, L and M.

34. Which one of the following processes does **not** affect the concentration of carbon dioxide in the atmosphere ?
A. Baking of bread.

B. Photosynthesis.
C. Rusting of iron.
D. Respiration.

35. The solid that shows an increase in mass when heated strongly is
A. sulphur.
B. sodium carbonate.
C. calcium carbonate.
D. magnesium.

36. The type of reaction that takes place during the preparation of ethene from ethanol is
A. oxidation.
B. hydrogenation.
C. reduction.
D. dehydration.

37. The substance that sublimes when heated is
A. phosphorus.
B. carbon.
C. iodine.
D. sulphur.

38. Which one of the following potassium salts will dissolve in water to give a solution that turns red litmus paper blue ?
A. B. C. D.
K_2CO_3 KC1 KNO_3 K_2S0_4
39. i Copper(II) sulphate reacts with sodium carbonate according to the following equation:
+ 0/C03 (j) + $Na_2SO_{A(aq)}$)
The mass of copper(II) carbonate that is formed when 200 cm of a solution containing 5.3g of sodium carbonate per litre of solution was reacted completely with copper(Il) sulphate is given by the expression:
[*C = 12, O = 16, Na = 23, Cu = 64, S = 32* \
A. $\frac{5.3 \times 200 \times 124}{106 \times 1000}$ [1]
g
B. $\frac{5.3 \times 124 \times 1000}{106 \times 200}$
C. $\frac{106 \times 200 \times 124}{5.3 \times 1000}$
g
D, $\frac{106 \times 124 \times 1000}{5.3 \times 200}$ [8]

40. Which one of the following is not a product of incomplete combustion of butane ?
A. Soot.
B. Water.
C. Carbon monoxide.
D. Carbon dioxide.

Each of the questions **41** *to* 45 *consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*
Select:
A. if both the assertion and the reason are **true** statements and the reason is a **correct** explanation of the assertion.
B. if both the assertion and the reason are **true** statements but the reason is **not a correct** explanation of the assertion.
C. if the assertion is **true** but the reason is **not a correct** statement. **I).** if the assertion is **not correct** but the reason is a **correct** statement.

INSTRUCTIONS SUMMARISED:
41.
42.

Assertion	Reason

A. B. C.	True True True	True (Reason True is a correct explanation) is not a (Reason Incorrect. correct explanation)
D.	Incorrect	Correct.

When aqueous potassium iodide is added to a solution of lead(II) **bccause** lead(II) iodide is insoluble in water, nitrate, a yellow precipitate is observed

25.0 em of a solution containing 4.0 g of sodium hydroxide in a **because** sulphuric acid reacts with sodium hydroxide in the mole ratio litre of solution will require exactly of 2:1 .

12.50cm of a 0.1 M sulphuric acid for complete reaction

A solution of hydrogen chloride **because** in methylbenzene does **not** conduct electricity methylbenzene does not conduct electricity.

44. Copper(II) hydroxide dissolves in excess aqueous ammonia

45. Coke is used to extract iron from its ore

because

copper(II) ion forms a complex ion with ammonia.

bccause coke is an oxidizing agent.

11

Turn

In each of the questions 46 *to* 50, *one or more of the answers given may he cor reel. Read each question carefully and then Indicate the correct answer according to the following:*

A. If 1, 2 and 3 only arc correct.
B. If 1 and 3 only are correct.
C. If 2 and 4 only are correct.
D. If 4 only is correct.

Which of the following substances can be used to test for water of crystallization :

1. Copper(II) sulphate.
2. Potassium dichromate.
3. Cobalt(II) chloride.
4. Potassium permanganate.

47. Which of the following is/are true about diamond and graphite?

1. They have the same mass number.
2. They are isotopes.
3. They are allotropes.
4. They show similar physical properties.

48. When concentrated sulphuric acid is added to sugar,

1. sugar turns black.
2. heat is evolved.
3. froathing is observed.
4. sulphur dioxide is evolved.

49. Which of the following properties is/are shown by hydrochloric acid ? The acid reacts with

1. copper to form hydrogen.
2. zinc to form hydrogen.
3. sodium hydroxide to give an acid salt.
4. calcium carbonate to form carbon dioxide.

50. Which of the following properties make carbon dioxide useful in fire extinguishers ?

1. It is denser than air.
2. It is lighter than air.
3. It is non-flammable.
4. It is an inert gas.

END

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*Do **not** use pencil.*

1. Which one of the following substances is **not** a mixture?
   A. Bronze.
   B. Steel.
   C. Water.
   D. Air.

2. Which one of the following substances is a strong electrolyte?
   A. Aqueous ethanoic acid.
   B. Ammonia solution.
   C. Aqueous carbonic acid.
   D. Aqueous potassium iodide.

3. The formula of a compound is $Y_3(PO_4)_2$. The electronic configuration of the atom of *Y* is
   A. 2:8:2 B. 2:8:3
   C. 2:8:4 D. 2:8:5

4. Which one of the following nitrates when heated decomposes to give a reddish- brown gas?
   A. Sodium nitrate B. Silver nitrate.
   C. Potassium nitrate. D. Ammonium nitrate. ; - ^

5. Propane burns in oxygen according to the following equation.
   $C_3H_{8(g)} + 5O_{2(g)} \longrightarrow 4\,H_2O_{(L)} + 3CO_{2(g)}$
   At a certain temperature and pressure, 10 litres of propane was completely burnt in oxygen. The volume of oxygen gas used was
   A. 5 litres B. 10 litres
   C. 15 litres D. 50 litres

6. The process used to obtain pure water from sea water is called
   A. sedimentation B. filtration
   C. distillation D. decantation

7. Which one of the following anions when in solution will react with lead (II) nitrate to form a white precipitate which dissolves on heating?
   A. Iodide ions B. Chloride ions
   C. Carbonate ions D. Sulphate ions

8. Which one of the following catalyst is used in the manufacture of sulphuric acid by the Contact process?

A. Vanadium (V) oxide.
B. Manganese (IV) oxide.
C. Platinised asbestos.
D. Finely divided iron.

9. Which one of the following is formed when excess sulphur dioxide gas is bubbled through sodium hydroxide solution?
A. Sodium sulphate
B. Sodium sulphite.
C. Sodium hydrogen sulphite.
D. Sodium hydrogen sulphate.

10. Which one of the following is not a property of sodium carbonate?
A. It turns into white powder when exposed to air.
B. It forms a white precipitate with lead (II) nitrate solution.
C. It dissolves in water to form a solution with pH less than seven.
D. It does not decompose when heated strongly.

11. The molarity of a solution containing 49 g of sulphuric acid in 250 cm^3 of solution is
[H = 1; O = 16; S = 32;]
A. 0.125 M.
B. 0.50 M.
C. 1.00M.
D. 2.00 M.

12. Which one of the following salts can be prepared by the action of dilute sulphuric acid on the metal?
A. $AL_2 (SO_4)_3$
B. $MgSO_4$
C. $CuSO_4$
D. $PbSO_4$

13. The figure below shows the graphs obtained when equal amount of marble chips of different sizes were reacted with excess 2M hydrochloric acid at room temperature.
Which one of the graphs represents the reaction of marble chips with the smallest particle size?
A. I. B. II. C. III. D. IV.

14. The atomic numbers and the mass numbers of atoms, *W, X, Y and Z* are shown in the table below.

Atom	Atomic number	Mass number
W	46	106
X	47	106
Y	47	109
Z	48	112

Which one of the following pairs of atoms are isotopes?
A. *W* and *X*.
B. *X* and Y.
- C. *Y* and Z
D. *W* and *Z*

15. Which one of the following oxides is soluble in both dilute nitric acid and dilute sodium hydroxide solution?
A. Copper (II) oxide.
B. Magnesium oxide.
C. Calcium oxide.
D. Zinc oxide.

16. Which one of the following processes is used to convert vegetable oil into fats?
A. Saponification.
B. Cracking.
C. Hydrogenation.
D. Polymerisation.

17. A metal *Y* and a non-metal *M* are elements in Period **3** of the Periodic Table. Which one of the following statements is **not** true about *Y and M*?
A. The solution of the compound formed between *Y* and *M* conducts electricity.
B. The atomic radius of *M* is smaller than that of *Y*.
C. The chloride of *Y* is ionic while that of *M* is covalent.
D. The oxide of *M* is basic while that of *Y* is acidic.

18. Potassium aluminium sulphate is used in the purification of water for
A. removing colouring matter
B. killing harmful bacteria
C. removing suspended matter
D. softening water

19. The mass of sodium hydroxide present in 200^3 cm of a 0.05 M sodium hydroxide solution is *[H = 1; O = 16; Na 23;]*
A. 0.25 g. B. 0.40g
C 2.00 g D. 10.00G

20. Which one of the following substances are normally formed when a metal is reacted with dilute mineral acid ?
A. Oxide of the metal and hydrogen gas.
B. A salt of the metal and water.
C. The hydroxide of the metal and hydrogen.
D. A salt of the metal and hydrogen.

21. Which one of the following substances will **not** oxidise concentrated hydrochloric acid to chlorine?
A. Potassium manganate (VII). B. Manganese (IV) oxide.
C. Lead (IV) oxide. D. Lead (II) oxide.

22. Glucose burns in oxygen according to the following equation;

$C_2H_{12}O_{6(s)} + 6O_{2\ (g)} \longrightarrow 6CO_{2\ (g)} + 6H_2O_{\ (L)} + Energy$

The volume of oxygen at s. t. p. that is required to produce 150 g of carbon dioxide is
[*H = 1, C—12, O = l 6; 1 mole of gas at s.t.p. occupies 22.4 dm^3]*

A. $((150\ X\ 22.4)/44)$ dm^3

B. $((50\ X\ 22.4)/(44\ X\ 6))$ dm^3

C. $((44)/(150\ X\ 22.4))$ dm^3

D. $((44\ X\ 6)/(150\ X\ 22.4))$ dm^3

23. Which one of the following is observed when concentrated nitric acid is boiled with iron (II) sulphate solution? The colour of the solution changes from.
A. green to yellow B. green to colourless
C. brown to green. D. yellow to brown

24. Which one of the following equations show the reaction that, takes place at the cathode during the electrolysis of concentrated sodium chloride solution using graphite electrode?
A. $4OH^-_{(aq)} \longrightarrow 2H_2O\ (l) + O_{2\ (g)} + 4e^-$ B. $2H^+_{(aq)} + 2e^- \longrightarrow H_{2\ (g)}$
C. $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}$ D. $2Cl^-_{(aq)} \longrightarrow Cl2_{\ (g)} + 2e^-_{\ (g)}$

25. Which one of the following metals will displace lead from lead (II) nitrate solution?
A. Silver B. Copper.
C. Zinc. D. Mercury.

26. On heating, sodium nitrate produces sodium nitrite and oxygen according to the following equation:
$2\ NaN0_{3\ (l)} \rightarrow$ **heat** $2\ NaNO_{2\ (s)} + O2_{\ (g)}$.
The mass of sodium nitrite formed when 480 cm^3 of oxygen was evolved at room temperature is
[N=*14, O=l 6, Na =23; 1 mole of gas at room temperature occupies 24 litres.]*

A. 1.38 g
B. 2.76 g
C. 5.52 g
D. 11.04g

27. Which one of the following gases can cause green house effect?
A. Nitrogen.
B. Oxygen.
C. Carbon monoxide.
D. Carbon dioxide.

28. The diagram below shows the set up of apparatus that was used to investigate the conditions under which rusting occurs.
The role of anhydrous calcium chloride is to absorb
A. carbon dioxide from the air
B. nitrogen from the air
C. moisture from the air
D. oxygen from the air

29. Which one of the following is observed when chlorine is exposed to sunlight?
A. A colourless gas is evolved which relights a glowing splint.
B. The solution turns from green to yellow.
C. A gas which bleaches litmus is evolved.
D. A colourless gas which burns with a pale blue flame is evolved.

30. The atomic numbers of elements *Q, R, T* and *X* are 8, 9, 12 and 13 respectively.
Which **one** of the following pairs of elements will form ions with the same number of charges?
A. *Q* and *R.*
B. *T* and *X.*
C. *X* and *R.*
D. *Q* and *T.*

31. Methane burns according to the following equation:

$CH_{4\,(g)} + 2O2\,(g) \longrightarrow CO_{2\,(g)} + 2H_2O_{\,(g)}$, $\Delta H = -890$ kJ

The volume of methane gas which when burnt will raise the temperature of 160g of water by 15°C is
[1 *mole of gas occupies 22.4 dm^3 at s.t.p.; Specific heat capacity of water is 4.2 Jg^{-1}°C^{-1}*]

A. $\left(\frac{890}{22.4\ X\ 10.08.}\right)$ dm^3
B. $\left(\frac{22.4\ X\ 10.08}{890.}\right)$ dm^3
C. $\left(\frac{890\ X\ 22.4}{10.08.}\right)$ dm^3
D. $\left(\frac{10.08\ X\ 890}{22.4\ .}\right)$ dm^3

32. Which one of the following is true about bases?
A. are soluble in water.
B. are hydroxides.
C. neutralise acids.
D. are oxides.

33. During the extraction of sodium from sodium chloride ore, calcium chloride is added to the ore before it is melted in order to
A. remove impurities in the ore.
B. catalyse the reaction.
C. lower the melting point of the ore.
D. increase the solubility of sodium in the ore.

34. Which one of the following pairs of substances is formed when ammonium carbonate is heated?
A. Ammonia and carbon monoxide.
B. Carbon dioxide and nitrogen monoxide.
C. Nitrogen and carbon dioxide.
D. Carbon dioxide and ammonia.

35. Which one of the following contains the same number of moles as 2.4 dm^3 of hydrogen gas at room temperature? **[1** *mole of gas occupies 24 dm^3 at room temperature; H=1; N-14; Cl=35.5]*

A. 17 g of ammonia gas.
B. 1.7g of ammonia gas.
C. 3.55 g of chlorine gas.
D. 35.5 g of chlorine gas.

36. Which one of the following is **not** true about concentrated sulphuric acid? Concentrated sulphuric acid

A. reacts with copper to liberate hydrogen.
B. reacts with glucose to form carbon.
C. reacts with ethanol to form ethene.
D. removes water from hydrated copper (II) sulphate.

37. A gaseous element *Y* is a strong oxidising agent and forms ionic compounds with group I elements. The group in the Periodic Table to which *Y* belongs is

A. III. B. IV. C. V D. VII.

38. When 3.0g of *X* was heated, 210cm^3 of a gas were evolved at s.t.p. and 2.4g of solid remained. The relative molecular mass of the gas is
[1 *mole of gas occupies 22.4 dm^3 at s.t.p]*

A. $\left(\frac{0.6\ X\ 22400}{210.}\right)$

B. $\left(\frac{3\ X\ 22400}{210.}\right)$

C. $\left(\frac{2.4\ X\ 22400}{210.}\right)$

D. $\left(\frac{5.4\ X\ 22400}{210.}\right)$

39. Which one of the following metals reacts slowly with cold water but rapidly with steam?

A. Calcium. B. Sodium.
C. Lead. D. Magnesium.

40. Copper (II) sulphate reacts with zinc according to the following ionic equation:

$$Cu^{2+}_{(aq)} + Zn_{(s)} \longrightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$$

The mass of copper that would be deposited when 100cm^3 of a 0.2 M copper (II) sulphate solution is reacted with excess zinc is

A. 0.64 g B. 1.28 g
C. 2.56 g D. 12.80 g.

Each of the questions **41** *and* 45 *consists of an assertion (statement) on the left-hand side and a reason on the right-hand side.*

Select

A. if both the assertion and the reason are **true** statements and the reason is a correct explanation of the assertion.
B. if both the assertion and the reason are true statements but the reason is **not** a **correct** explanation of the assertion.
C. if the assertion is true but the reason **is not** a **correct** statement.
D. if the assertion is **not correct** but the reason is a **correct** statement.

INSTRUCTIONS SUMMARISED:

	Assertion	Reason
A.	True	True (Reason is a correct explanation)
B.	True	True (Reason is **not** a correct explanation)
C.	True	Incorrect
D.	Incorrect	Correct

41.	The reaction between ammonia and copper (II) oxide is similar to that between hydrogen and lead (II) oxide.	**because**	both copper and lead are divalent in the oxides.
42.	The number of protons in an atom is equal to the number of neutrons.	**because**	the mass of protons is approximately equal to that of a neutron
43.	Graphite and diamond show different chemical properties.	**because**	graphite and diamond are allotropes of carbon.
44.	During the manufacture of chlorine by electrolysis of brine, the cathode is made of mercury.	**because**	chlorine gas is soluble in water.
45.	Ethene changes the colour of bromine water from reddish-brown to colourless	**because**	ethene is a hydrocarbon.

In each of the questions **46** *to* **50,** *one or more of the answers given may be correct Read each question carefully and then indicate the correct answer according to the following.*

A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct.
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Which of the following substances undergoes a physical change when heated strongly?
1. Copper (II) nitrate.
2. Ammonium chloride.
3. Potassium chlorate.
4. Zinc oxide.

47. Which factor(s) determine the ion to be discharged at an electrode during electrolysis?
1. The nature of electrode used.
2. The amount of current passed.
3. The position of ion in the activity series.
4. The charge on the ion.

48. On going down a group in the Periodic Table
1. atomic number increases.
2. number of shells increases.
3. ionic radius increases.
4. non-metallic character increases.

49. The following is/are **correct** about polyethene.
1. It is a themo-softening plastic.
2. It is a thermosetting plastic.
3. It is a hydrocarbon.
4. It conducts heat and electricity.

50. Which of the following ions reacts with sodium hydroxide solution to form a precipitate that is soluble in excess sodium hydroxide solution?
1. $Cu^{2+}_{(aq)}$.
2. $Al^{3+}_{(aq)}$.

3. $Fe^{3+}_{(aq)}$.

4. $Pb^{2+}_{(aq)}$.

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Answer **all** *questions.*

You are required to write the correct answer **A, B, C** *or* **D** *in the box provided on the right-hand side of each question.*

Do **not** *use pencil.*

1. Which one of the following gases has the highest solubility in water?

A. Carbon dioxide
B. Chlorine
C. Hydrogen chloride
D. Oxygen

2. The atomic number of an element R is 13. The electronic configuration of the ion of R is

A. 2:8:8
B. 2:8:5
C. 2:8:3
D. 2:8

3. Which one of the following hydrocabons is saturated?

A. C_2H_4
B. C_2H_6
C. C_3H_6
D. C_4H_8

4. The substance formed when iron rusts is

A. hydrated iron (II) oxide
B. anhydrous iron (II) oxide
C. hydrated (III) oxide
D. anhydrous iron (III) oxide

5. The graph in figure 1 shows the cooling curve for naphthalene.

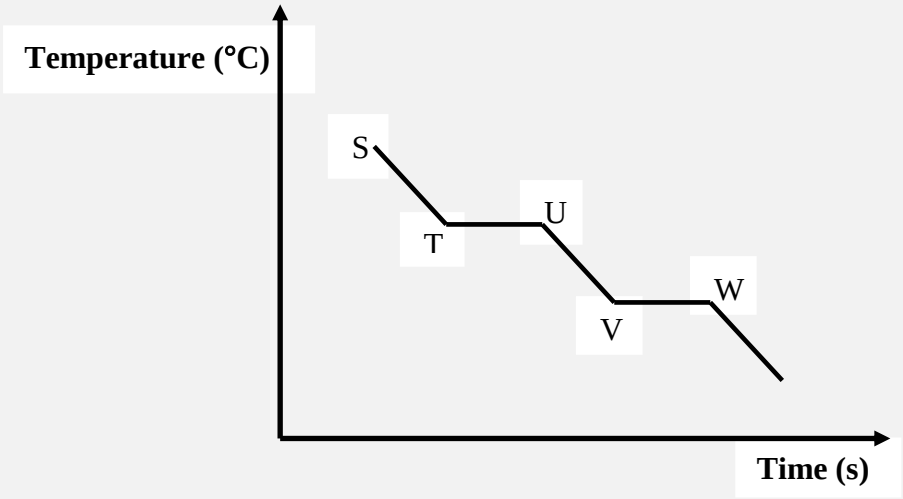


Fig. 1

Which part of the graph represents the change from liquid to solid?

A. ST
B. TU

C. UV D. VW

6. 40 g of zinc sulphide combined with 30 g of water of crystallization. If the formula of hydrated zinc sulphide is $ZnS \bullet xH_2O$, find the value of x. [Zn = 65, S = 32, O = 16]

A. 2 B. 3
C. 4 D. 5

7. The atomic number and the mass number of an element X are 11 and 23 respectively. The number of protons, netrons and electrons in the atom of X is

	Protons	Neutrons	Electrons
A.	11	12	11
B.	12	11	11
C.	11	12	12
D.	11	11	12

8. Which one of the following samples of water forms scum with soap?

A. Rain water B. Distilled water
C. deionised water D. Sea water

9. Which one of the following reagents can be used to distinguish sulphuric acid from nitric acid?

A. Potassium iodide solution B. Sodium carbonate solution
C. Sodium dichromate solution D. Barium chloride solution

10. 5.72 g of hydrated sodium carbonate, $Na_2CO_3.10H_2O$ was dissolved in water to make 500 cm^3 of a solution. The molarity of the soltuion is [Na = 23, O = 16, C = 12, H = 1].

A. 0.05 M B. 0.02 M
C. 0.04 M D. 0.11 M

11. The full symbol of an atom, Y is $^{24}_{11}Y$, and the atomic numbers of elements L, M, R and Z are 12, 13, 19 and 20 respectively. The element that can form an oxide with a similar formula to the oxide of Y is

A. R B. Z
C. M D. L

12. Which one of the following substance(s) is/are formed at the anode when zinc sulphate solution is electrolysed using carbon electrodes?

A. Water and oxygen B. Water only
C. Zinc only D. Zinc and hydrogen

13. The best method that can be used to separate a mixture of alcohol and paraffin is

A. filtration B. crystallisation
C. distillation D. chromatoography

14. The ease with which calcium, iron, magnesium and zinc react with dilute hydrochloric acid to produce hydrogen is in the order

A. $Ca > Mg > Zn > Fe$
B. $Mg > Ca > Fe > Zn$
C. $Fe > Zn > Mg > Ca$
D. $Ca > Zn > Fe > Mg$

15. 25 cm^3 of 0.12 M sodium hydroxide was neutralized by 30.0 cm^3 of a solution of a dibasic acid. The molarity of the acid is
A. 0.05 M
B. 0.06 M
C. 0.01 M
D. 0.12 M

16. Lead (II) carbonate when reacted with dilute hydrochloric acid give a low yield of carbon dioxide because
A. dilute hydrochloric acid is a weak acid.
B. the acid becomes more dilute with time.
C. lead (II) carbonate is insoluble in water
D. lead (II) chloride forms a protective layer on the carbonate.

17. Which one of the following pairs of substances will not react to produce chlorine?
A. Potassium manganate (VII) and concentrated hydrochloric acid.
B. Hydrogen chloride and potassium manganate (VII) solution.
C. Sodium chloride and concentrated sulphuric acid.
D. Manganese (IV) oxide and concentrated hydrochloric acid.

18. Which one of the following pairs of ions consists of ions that react with aqueous ammonia to form precipitates which are soluble in excess aqueous ammonia?
A. Zn^{2+} and Al^{3+}
B. Zn^{2+} and Fe^{2+}
C. Zn^{2+} and Zn^{2+}
D. Cu^{2+} and Fe^{3+}

19. The atomic numbers of elements X, Y, Z and W are 6, 7, 12 and 16 respectively. The element that forms an ionic bond with chlorine is
A. W
B. X
C. Y
D. Z

20. Methat burns in air according to the following equation;

$$CH_4\,(g) + 2O_2\,(g) \rightarrow CO_2\,(g) + 2H_2O\,(l) \qquad \Delta H = -850\ kJ\ mol^{-1}$$

The heat liberated when 5.0 g of methane is completely burnt in air is
A. 531.2 kJ
B. 425.0 kJ
C. 265.6 kJ
D. 53.1 kJ

21. Which one of the following pairs of polymers are synthetic polymers?
A. Polythene and silk
B. wool and cotton
C. Perspex and nylon
D. Wool and polythene

22. The atomic numbers of elements Q, W, X and Y are 4, 9, 10 and 14. Respectively. Which one of the elements can form positively charged ions?
A. Q
B. W
C. X
D. Y

23. When carbon dioxide is bubbled through lime water, the latter turns milky and finally clears because
A. the reaction between lime water and carbon dioxide is reversible.
B. lime water is a good solvent for the milky substance formed.
C. the milky substance reacts to form a soluble compound.
D. carbon dioxide eventually dissolves in lime water to form carbonic acid.

24. Which one of the following samples contains the greatest mass of the compound?
[$Na_2SO_4 = 142$; Na_2CO_3; NaCl = 58.5; NaOH = 40]

A. 0.2 moles of Na_2SO_4 B. 0.3 moles of Na_2CO_3
C. 0.5 moles of NaCl D. 0.6 moles of NaOH

25. Which one of the following ions makes water hard?

A. HCO_3^- (aq) B. Mg^{2+} (aq)
C. Na^+ (aq) D. SO_4^{2-} (aq)

26. When concentrated sulphuric acid is added to sugar, a black substance is produced. This is because sulphuric acid is

A. a strong corrosive acid B. a strong dehydrating agent
C. a strong reducing agent D. a strong oxidising agent

27. Which one of the following solution will neutralize 100 cm^3 of a 0.8 M hydrochloric acid?

A. 10 cm^3 of 0.08 M sodium hydroxide
B. 50 cm^3 of 0.4 M sodium hydroxide
C. 50 cm^3 of 0.8 M sodium hydroxide
D. 80 cm^3 of 1 M sodium hydroxide

28. Which one of the following is true about group VII elements?

A. They form ions of formula X^-.
B. They form ions of formula X^+.
C. They are colourless.
D. They exist as monoatomic molecules

29. Which one of the following anions when in solution will react with acidified silver nitrate to form white precipitates?

A. Sulphite B. Carbonate
C. Chloride D. Nitrate

30. Methat burns in air according to the following equation;

$$CH_4\ (g) + 2O_2\ (g) \rightarrow CO_2\ (g) + 2H_2O\ (l)$$

The volume of carbon dioxide formed when 20 cm^3 of methane is burnt in 20 cm^3 of oxygen is

A. 10 cm^3 B. 20 cm^3
C. 40 cm^3 D. 60 cm^3

31. Which one of the following is observed when magnesium is heated with copper (II) oxide?

A. A green solid is formed B. A black solid is formed
C. A grey solid is formed D. A white solid is formed

32. Which one of the following statements is **not** true about butane?

A. It is used as fuel B. it is a hydrocarbon
C. it decolourises bromine water D. It is a saturated compound

33. The suitable method of preparing anhydrous iron (II) chloride is by

A. passing dry chlorine over heated iron.
B. reacting iron (II oxide with dilute hydrochloric acid.
C. passing dry hydrogen chloride gas over heated iron.
D. reacting iron with dilute hydrochloric acid.

34. Calcium carbonate decomposes on heating according to the following equation:

$$CaCO_3\ (g) \rightarrow CaO\ (s) + CO_2\ (g)$$

The maximum volume of carbon dioxide produced at stp when 10.0 g of calciulm carbonate is heated is [$CaCO_3$ = 100; 1 mole of gas occupies 22.4 dm^3 at stp]

A. $\frac{10 \times 22.4}{100}\ dm^3$ B. $\frac{10 \times 100}{22.4}\ dm^3$

C. $\frac{22.4}{10 \times 100}\ dm^3$ D. $\frac{100}{10 \times 22.4}\ dm^3$

35. Which one of the following substances will dissolve in water to give a solution that turns blue litnus red?

A. $(NH_4)_2SO_4$ B. NaCl

C. CH_3CH_2OH D. K_2CO_3

36. Which one of the following is not carried out during the manufacture of sulphuric acid?

A. Sulphur is burnt in air to form sulphur dioxide.

B. Sulphur dioxide and air are heated.

C. Sulphur trioxide is dissolved in water.

D. Vanadium (V) oxide is used as a catalyst.

37. The table below shows the atomic mass, atomic number and number of neutrons in the neucleus of the atoms M, Q, R and T.

Atom	**M**	**Q**	**R**	**T**
Atomic mass	29	31	12	13
Atomic number	13	15	6	6
Number of neutrons	16	16	6	7

Which one of the following pairs of atoms belongs to the same lement?

A. M and Q B. M and T

C. Q and T D. R and T

38. Zinc carbonate decomposes according to the following equation when heated:

$$ZnCO_3\ (g) \rightarrow ZnO\ (s) + CO_2\ (g)$$

The mass of zinc oxide formed when 2.5 g of zinc carbonate is heated is [Zn = 65; O = 16; C = 12]

A. 0.41 g B. 0.81 g

C. 1.62 g D. 3.24 g

39. Which one of the following is not a property of zinc oxide?

A. It is soluble in sodium hydroxide solution.

B. It is yellow when hot and white when cold.

C. It is soluble in water.

D. it is soluble in hydrocholoric acid.

40. Which one of the following alloptropes of carbon conducts electricity?

A. Diamond B. Graphite

C. Coal D. Coke

Each of the questions **41** to **45** consists of an assertion (statement) on the left hand side and the reason on the right hand side.

Select:

A. if both the assertion and the reason are true statement and the reason is a correct explanation of the assertion.

B. If both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion.
C. If the assertion is true but the reason is not a correct statement.
D. If the assertion is not correct but the reason is a correct statement

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (Reason is a correct explanation)
B.	True	True (Reason is **not** a correct explanation)
C.	True	Incorrect
D.	Incorrect	Correct

41.	The components of a plant pigments can be separated by chromatography	**because**	the components of plant pigments move at different rates during chromatography
42.	Hydrogen gas can be collected by upward delivery during preparation	**because**	it is denser than water.
43.	Element X (atomic number 13) combines with element W (atomic number 8) to form an ionic compound	**because**	element X is in period three of the Periodic Table.
44.	Carbon dioxide and carbon monoxide are pollutants	**because**	both of them are reducing agents
45.	Ammonium nitrate (NH_4NO_3) is a better fertilizer than ammonium sulphate	**because**	ammonium nitrate contains a higher percentage of nitrogen than ammonium sulphate [H = 1; N = 14; O = 16; S = 32]

In each of the question **46** *to* **50**, *one or more of the answers given may be correct.*
Read each question carefully and then indicate the correct answer according to the following:

A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Which one of the following statements is/are true about polythene?
1. It is biodegradable.
2. it is a man-made polymer.
3. It is a natural polymer.
4. It can be remolded.

47. Which one of the following gases can react to form acidic solution?
1. Chlorine.
2. Nitrogen monoxide.
3. Nitrogen dioxide.
4. Hydrogen.

48. During electroplating of iron with copper, the
1. cathode is made of iron.
2. anode is made of copper.
3. electrolyte is copper (II) sulphate solution.
4. electrolyte is iron (II) sulphate solution.

49. Which one of the following nitrate(s) when heated strongly will give off brown gas?
1. Copper nitrate.
2. Potassium nitrate
3. Lead (II) nitrate.
4. Ammonium nitrate.

50. Which one of the following solutions contain the same number of hydrogen ions?
1. 1 litre of 2 M hydrochloric acid.
2. 1 litre of 1 M sulphuric acid.
3. 2 litres of 1 M nitric acid.
4. 2 litres of 2 M hydrochloric acid.

545/1 CHEMISTRY PAPER 1 Nov./Dec. 2011 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

1. Which one of the following substances when heated undergoes a chemical change?
   A. Candle wax
   B. Ammonium chloride
   C. Zinc oxide
   D. Sodium nitrate

2. Which one of the following elements does not react with chlorine?
   A. Aluminium
   B. Oxygen
   C. Sodium
   D. Argon

3. A mixture of two soluble salts can best be separated by
   A. filtration
   B. decanting
   C. fractional crystallisation
   D. fractional distillation

4. Which one of the following allotropes of carbon is used during the manufacture of sugar?
   A. Lampblack
   B. Wood charcoal
   C. Sugar charcoal
   D. Animal charcoal

5. The atomic number of elements M, N, R and T are 1, 8, 12 and 14 respectively. The element which can form ions by either losing or gaining electron(s) is
   A. M
   B. N
   C. R
   D. T

6. Which one of the following compounds contains the highest percentage if sulphur?
   A. $H_2S_2O_7$
   B. H_2SO_4
   C. SO_2
   D. H_2S

7. Which one of the following substances are components of chlorine water?
   A. Chlorine and water
   B. Hydrochloric acid
   C. Hydrochloric acid and chlorine
   D. Hypochlorous acid and water

8. Which one of the following is likely to be the pH of a dilute hydrochloric acid?
   A. 2
   B. 6
   C. 7
   D. 9

9. Which one of the following is the formula of the complex formed when aluminium is dissolved in sodium hydroxide solution?
   A. $[Al(OH)_4]^+$
   B. $[Al(OH)_4]^-$
   C. $[Al(OH)_4]^{3+}$
   D. $[Al(OH)_4]^{3-}$

10. When 5.74 g of a hydrated salt X was heated, 3.22 g of the anhydrous salt, Y was formed. The number of moles of water of crystallisation in X is [Y = 161; O = 16; H = 1]
   A. 2
   B. 5
   C. 7
   D. 10

11. Which one of the following oxides will not react with water?
   A. Sulphur oxide
   B. Nitrogen dioxide
   C. Calcium oxide
   D. Zinc oxide

12. To which one of the following groups and periods in the Periodic Table does an element with atomic number 20 belong?
   A. Group II, Period 4
   B. Group IV, Period 2
   C. Group II, Period 2
   D. Group IV, Period 4

13. Which one of the following is a property of carbon dioxide? It
   A. is less dense than air
   B. is neutral to litmus paper
   C. reacts with sulphuric acid
   D. reacts with burning magnesium

14. 2.07g of a metal Z, combined with oxygen to form 3.02g of oxide. Which one of the following is the formula of the oxide of Z?
   [O = 16, Z = 52]
   A. Z_2O_3
   B. Z_3O_2
   C. Z_2O
   D. ZO_2

15. Which one of the following salts can be prepared by direct synthesis?
   A. Lead (II) iodide
   B. Ammonium nitrate
   C. Sodium carbonate
   D. Iron (II) chloride

16. Which one of the following sodium salts will react with dilute sulphuric acid to form a gas that turns potassium manganate(VII) colourless?

A. Sodium chloride
B. Sodium nitrate
C. Sodium sulphite
D. Sodium carbonate

17. When 80 cm^3 of air was passed over heated copper, 64 cm^3 of gas remained. The percentage of air that reacted with copper is

A. $\left(\frac{80 \times 100}{64}\right)\%$
B. $\left(\frac{(80-64) \times 100}{80}\right)\%$
C. $\left(\frac{(80-64) \times 100}{64}\right)\%$
D. $\left(\frac{64 \times 100}{80}\right)\%$

18. Which one of the following metal oxides **cannot** be converted to the metal by heating the oxide together with coke?

A. Zinc oxide
B. Iron(II) oxide
C. Aluminium oxide
D. Lead (II) oxide

19. The full symbol of an atom is $^{39}_{19}Z$. The number of protons, electrons and neutrons in the ion formed by Z are

	Electrons	**Protons**	**Neutrons**
A.	19	19	20
B.	18	19	20
C.	19	18	20
D.	18	20	19

20. Which one of the following gases is produced when lead(II) nitrate is heated strongly?

A. Nitrogen
B. Dinitrogen oxide
C. Nitrogen monoxide
D. Nitrogen dioxide

21. Sulphur dioxide reacts with oxygen according to the following equation:

$2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$

The volume of sulphur trioxide formed when 20 cm^3 of sulphur dioxide is reacted with 100 cm^3 of oxygen at s.t.p is

[1 mole of a gas occupies 22400 cm^3 at s.t.p]

A. 120 cm^3
B. 30 cm^3
C. 20 cm^3
D. 10 cm^3

22. The equations below show reactions between elements X, Y and Z.

(i) $Z(s) + X^{2+}(aq) \longrightarrow Z^{2+}(aq) + X(s)$

(ii) $Y(s) + Z^{2+}(aq) \longrightarrow Y^{2+}(aq) + Z(s)$

The order of the reactivity of the elements starting with the least reactive is

A. X, Z, Y
B. Y,X, Z
C. Y,Z, X

D. Z, Y,X

23. Which of the following substances are formed when dilute nitric acid reacts with sodium hydrogen carbonate?
A. Sodium nitrate, carbon dioxide and hydrogen
B. Sodium nitrite, carbon dioxide and oxygen
C. Sodium nitrate, carbon dioxide and water
D. Sodium nitrite, carbon dioxide and water

24. Butane undergoes combustion according to the following equation:

$$2C_4H_{10}(g) + 3CO_2(g) \longrightarrow 8CO_2(g) + 10H_2O(l) + \text{Heat}$$

The mass of butane required to produce 950 kJ of heat is
[H = 1, C = 12; 1 mole of butane produces 287kJ of heat]

A. $\frac{950 \times 58}{2 \times 2877}\ g$

B. $\frac{950 \times 58}{2877}\ g$

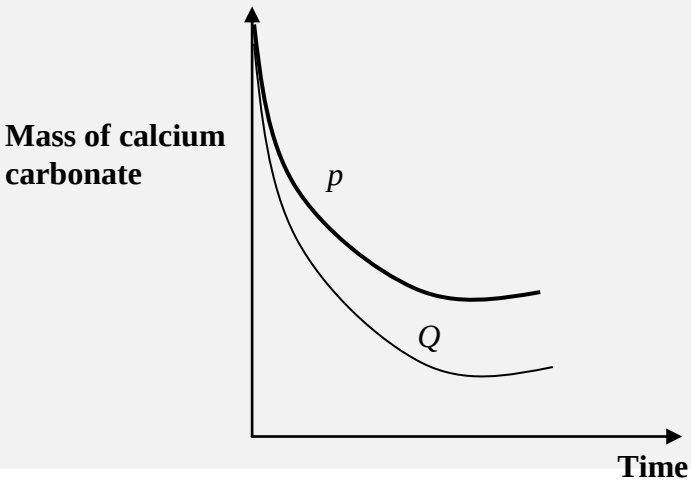
C. $\frac{950 \times 58 \times 2}{2877}\ g$

D. $\frac{2877 \times 58}{950}\ g$

25. Which one of the following equations shows the reactino which does **not** take place during the manufacture of nitric acid from ammonia?
A. $2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$
B. $2H_2O(l) + 4NO_2(g) + O_{2(g)} \longrightarrow 4HNO_3(aq)$
C. $4NH_3(g) + 3O_2(g) \longrightarrow 2N_2(g) + 6H_2O(l)$
D. $4NH_3(g) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(l)$

26. Which one of the following oxides, when heated, will react with carbon to form a brown solid?
A. CuO
B. ZnO
C. PbO
D. FeO

27. Curve P in the graph below shows the variation in mass of calcium carbonate powder with time when it is reacted with excess hydrochloric acid at room temperature.



To obtain curve Q, one would keep all the conditions the same **except**

A. İncrease the concentration of the acid
B. İncrease the mass of the carbonate powder
C. Reduce the temperature
D. Use the same of marble chips

28. Which one of the following gases is evolved when a mixture of concentrated sulphuric acid, manganese(IV) oxide and sodium cloride is warmed?

A. Hydrogen chloride
B. Sulphur dioxide
C. Chlorine
D. Oxygen

29. 25.0 cm^3 of a 2.0 M sodium hydroxide solution reacted with 16.6 cm^3 of a 0.01 M solution of an acid. The ratio in which the acid reacted with sodium hydroxide is

A. 1 : 2
B. 1 : 3
C. 2 : 1
D. 3 : 1

30. Which **one** of the following cations when in solution will **not** form a precipitate when reacted with sodium sulphate solution?

A. Ca^{2+}
B. Pb^{2+}
C. Ba^{2+}
D. Zn^{2+}

31. Which one of the following is **not** a property of carbon?

A. It conducts electricity
B. It reduces iron(III)oxide
C. It burns in air to form a basic oxide
D. It shows allotropy

32. Which one of the following equations shows the reaction in which sulphuric acid is behaving as an oxidising agent?

A. $Cu(s) + 2H_2SO_4(aq) \xrightarrow{\textbf{heat}} CuSO_4(aq) + SO_2(g) + H_2O(l)$

B. $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$

C. $C_2H_5OH(l) \xrightarrow[\textbf{heat}]{H_2SO_4(aq)} C_2H_4(g) + H_2O(l)$

D. $Mg(s) + H_2SO_4(aq) \longrightarrow MgSO_4(aq) + H_2(g)$

33. Magnesium burns in air according to the following equation:

$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$

The mass of oxygen required to burn 5g of magnesium completely is
[O = 16 ; Mg = 24]

A. $\frac{5 \times 16}{24}\ g$

B. $\frac{5 \times 16}{48}\ g$

C. $\frac{5 \times 32}{24}\ g$

D. $\frac{5 \times 32}{48}\ g$

34. Which one of the following compounds can undergo polymerisation reaction?
A. CH_4
B. C_2H_4
C. C_3H_8
D. C_4H_{10}

35. Which of the following substances are formed when concentrated nitric acid reacts with copper?
A. Copper(II) nitrate and nitrogen dioxide
B. Copper(II) nitrate and nitrogen monoxide
C. Copper(I) nitrate and nitrogen dioxide
D. Copper(II) nitrate and dinitrogen oxide

36. Both calcium carbonate and copper(II) carbonate decompises according to the following equation when heated.

$MCO_3(s) \xrightarrow{\textbf{heat}} MO(s) + CO_2(g)$
[Where M = Ca or Cu]

The mass of copper(II) carbonate which, when heated will give off the same volume of carbon dioxide as 10.0 g of calcium carbonate is
[$CaCO_3$ = 100 ; $CuCO_3$ = 124]

A. 1.24 g
B. 6.40 g
C. 12.40 g
D. 24.80 g

37. Which one of the following ions is discharged at the cathode when brine is electrolysed using mercury cathode?
A. Hydrogen
B. Sodium
C. Hydroxide
D. Chloride

38. Nitric acid reacts with potassium hydroxide according to the following equation.
$HNO_3(aq) + KOH(aq) \longrightarrow KNO_3(aq) + H_2O(l)$

When 20 cm^3 of a 2M nitric acid was added 20 cm^3 of a 2M potassium hydroxide solution, the temperature of the solution rose by 13.0 ^0C. The molar heat of neutralisation of the nitric acid is

[Assume the specific heat capacity of the solution is 4.2 J g^{-1} $^0C^{-1}$ and the density is 1g cm^{-3}]

A. 1092 J mol^{-1}
B. 27, 300 J mol^{-1}

C. 2184 J mol^{-1}
D. 54, 600 J mol^{-1}

39. Which one of the following pairs of hydrocarbons can be represented by the same general formula?
A. Ethane and ethene
B. Ethane and propane
C. Ethene and methane
D. Ethene and Butane

40. Ammonia reacts with copper(II) oxide according to the following equatio.

$2NH_3(g) + 3CuO(s) \longrightarrow 3H_2O(l) + N_2(g) + 3Cu(s)$

The volume of ammonia at s.t.p that will react with 6.0 g of copper (II) oxide is
[H = 1; N = 14; 0 = 16; One mole of gas occupies 22.4 dm^3 at s.t.p]

A. 3.36 dm^3
B. 2.52 dm^3
C. 1.68 dm^3
D. 1.12 dm^3

*Each of the questions **41** to **45** consists of an assertion (statement) on the left hand side a reason on the right-hand side.*

Select
A. if both the assertion and the reason are true statement and the reason is a correct explanation of the assertion.

B. If both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion.

C. If the assertion is true but the reason is not a correct statement.

D. If the assertion is not correct but the reason is a correct statement

INSTRUCTIONS SUMMARISED:

Assertion		**Reason**
A.	True	True (Reason is a correct explanation)
B.	True	True (Reason is **not** a correct explanation)
C.	True	Incorrect
D.	Incorrect	Correct

41.	Sodium reacts vigorously with water to produce hydrogen	**because**	Sodium is highly electropositive.
42.	When a piece of phosphoruos is lowered into a jar of chllorine, white fumes are observed.	**because**	Hydrogen chloride is formed during the reaction.
43.	A peice of magnesium continues to burn in a gas jar of carbon		Carbon dioxide contains two atoms of oxygen.

	dioxide.	**because**	
44.	Ammonia is prepared by reacting ammonium salt with calcium hydroxide	**because**	Calcium hydroxide is a base.
45.	When sodium peroxide is dissolved in water, a gas is evolved.	**because**	Sodium peroxide reacts with water to form hydrogen.

In each of the question **46** *to* **50***, one or more of the answers given may be correct.*
Read each question carefully and then indicate the correct answer according to the following:

A. If 1, 2 and 3 only are correct.
B. If 1 and 3 only are correct
C. If 2 and 4 only are correct.
D. If 4 only is correct.

46. Which of the following is/are true about electroplating of iron with silver?
1. Silver nitrate solution is used as electrolyte
2. Silver is made the anode
3. Iron is made the cathode
4. Iron(II) sulphate solution is used as electrolyte

47. Which of the following is/are property/properties of alkalis?
1. turn red litmus solution blue.
2. contains hydroxide ions
3. are soluble in water
4. turn blue litmus paper red

48. In which of the following equations is sulphur dioxide (SO_2) behaving as a reducing agent?
1. $Cl_2(g) + 2H_2O(l) + SO_2(g) \longrightarrow H_2SO_4(aq) + 2HCl(g)$
2. $2Mg(s) + SO_2(g) \longrightarrow MgO(g) + S(s)$
3. $2HNO_3(l) + SO_2(g) \longrightarrow H_2SO_4(aq) + 2NO_2(s)$
4. $H_2S(g) + SO_2(g) \longrightarrow S(s) + H_2O(l)$

49. Which of the following usually cause(s) water pollution?

1. Calcium hydrogen carbonate
2. Phosphate detergents
3. Magnesium sulphate
4. Sewage

50. Which of the following statement(s) is/are true about elements in group-II in the periodic Table?
1. They have similar chemical properties
2. They have same number of electron shells
3. Their ions carry same number of charge
4. Their reactivity increases as you go up the group.

545/1 CHEMISTRY PAPER 1 Nov./Dec. 2012 1½ hours	UGANDA NATIONAL EXAMINATION BOARD Uganda Certificate of Education CHEMISTRY Paper 1 Time: 1½ hours

Go to Index | E-mail Designer | FAQs

1.

FAQ's

POSSIBLE PROBLEMS MAY BE FACED

PLEASE SEND US YOUR COMMENTS AND QUESTIONS.